MALCOLM PIRNIE

Final Buildings
Quality Assurance Project Plan

Cornell-Dubilier Electronics Superfund Site,
South Plainfield, NJ

For: U.S. Army Corps of Engineers

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Prepared by:
Malcolm Pirnie, Inc.
104 Corporate Park Drive
White Plains, New York 10602

U.S. Army Corps of Engineers
Kansas City District

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

BUILDINGS QUALITY ASSURANCE PROJECT PLAN

FOR OPERABLE UNIT 2 (OU-2)

U.S. ARMY CORPS OF ENGINEERS

CONTRACT NO. DACW41-02-D-0003

CONTRACTOR QC SIGN-OFF

Malcolm Pirnie, Inc. has reviewed this document.

Project Manager

Date: 1/17/06

Quality Assurance Manager

Date: 1/12/06

Project Quality Control Manager

Date: 1/13/06

CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

BUILDINGS QUALITY ASSURANCE PROJECT PLAN

FOR OPERABLE UNIT 2 (OU-2)

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ABBREVIATIONS AND ACRONYMS

%R	Percent Recovery
ACM	Asbestos Containing Materials
AES	Atomic Emission Spectroscopy
AIHA	American Industrial Hygiene Association
AL	Action Level
ACHERA	Asbestos Hazard Emergency Response Act
ASTM	ASTM is the name of the non-profit standards organization formerly called the American Society for Testing and Materials
CIH	Certified Industrial Hygienist
CLP	Contract Laboratory Program
COC	Chain of Custody
CSP	Certified Safety Professional
CVAA	Cold Vapor Atomic Absorption
DESA	Division of Environmental Science and Assessment
D	Replicate
DOT	Department of Transportation
DPM	Deputy Project Manager
DQA	Data Quality Audit
DQO	Data Quality Objectives
ECD	Electronic Capture Detector
EDD	Electronic Data Deliverable
ERRD	Emergency and Remedial Response Division
FSP	Field Sampling Plan
FTL	Field Team Leader
GC	Gas Chromatography
GC-ECD	Gas Chromatography-Electron Capture Detector
GC-MS	Gas Chromatography-Mass Spectrometry
HASP	Health and Safety Plan
HUD	Department of Housing and Urban Development
ICP	Inductively Coupled Plasma
ICP-AES	Inductively Coupled Plasma-Atomic Emission Spectrometry
LCS	Laboratory Control Standard
LIMS	Laboratory Information Management System
MD	Matrix Duplicate
MDL	Method Detection Limit

MS	Mass Spectrometer *or* Matrix Spike
MSD	Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
NLLAP	National Environmental Lead Accreditation Program
NESHAP	National Emission Standards for Hazardous Air Pollutants
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NVLAP	National Voluntary Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
OU	Operating Unit
PA	Performance Audit
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PCB	Polychlorinated Biphenyl
PE	Performance Evaluation
PLM	Polarized Light Microscopy
PM	Project Manager
ppb	parts per billion
ppm	parts per million
PRG	Preliminary Remediation Goals
PSO	Project Safety Officer
QA	Quality Assurance
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCCS	Quality Control Check Sample
QCP	Quality Control Plan
QCS	Quality Control Standard
QCT	Quality Control Team
QL	Quantitation Limit
R	Recovery
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RL	Reporting Limit
RPD	Relative Percent Difference
RSCC	Regional Sample Control Center
SA	Spike added to spiking matrix

SDG	Sample Delivery Group
SMO	Sample Management Officer
SOP	Standard Operating Procedure
SOW	Statement of Work
SR	Spike result
SSR	Spike sample result
TAL	Target Analyte List
TAT	Turnaround Time
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TD	Technical Director
TSCA	Toxic Substances Control Act
µg/kg	microgram per kilogram
µm	micron or micrometer
USACE-KC	United States Army Corps of Engineers-Kansas City District
USEPA	United States Environmental Protection Agency

1.0 PROJECT MANAGEMENT

This Quality Assurance Project Plan (QAPP) was developed to address the quality assurance and quality control (QA/QC) elements of the Cornell-Dubilier Site activities as outlined in the Buildings Field Sampling Plan (FSP). It details the planning processes for collecting data and describes the implementation of the QA and QC activities developed for this program. The purpose of this QAPP is to generate project data that are technically valid and legally defensible. The QAPP consists of four main components:

- Project Management
- Measurement and Data Acquisition
- Assessment and Oversight
- Data Validation and Usability

The above components will incorporate QA/QC requirements cited within the following documents:

- U.S. Environmental Protection Agency (USEPA) Requirements for Quality Assurance Project Plans, USEPA QA/R-5, March 2001.
- USEPA Guidance for Quality Assurance Project Plans, USEPA QA/G-5, December 2002.
- USEPA Guidance for the Data Quality Objectives Process, QA/G-4, August 2000.

1.1 DISTRIBUTION LIST

Copies of the QAPP will be distributed to the following:

- Peter Mannion, USEPA Region 2, Project Manager
- Jennifer Feranda, USEPA Region 2, Regional Sample Control Coordinator (RSCC)
- Garth Anderson, U.S. Army Corps of Engineers – Kansas City District (USACE-KC), Project Officer
- Ken Maas, U.S. Army Corps of Engineers – Kansas City District (USACE-KC)

Electronic copies of the QAPP and related project documents will also be available in the project directory for all the Malcolm Pirnie project personnel named in the organization chart in given in Figure 1 whose responsibilities are described in Section 1.2, and other Malcolm Pirnie personnel assigned to assist in the project. Copies of the QAPP will also be made available to any non-EPA subcontract laboratories.

1.2 PROJECT/TASK ORGANIZATION

1.2.1 Overview

The project management team will consist of representatives from USEPA Region 2, USACE-KC, and Malcolm Pirnie, Inc. (Malcolm Pirnie). The USEPA Region 2 and the USACE-KC will provide project and contract management guidance to Malcolm Pirnie. Malcolm Pirnie will be the primary contractor and will be responsible for developing and implementing the investigation and will provide project management to the other subcontractors. Figure 1 presents the project organization.

1.2.2 Project Management Structure

This section contains a description of the project organizational structure. Peter Mannino is the USEPA Project Manager with responsibility for the Cornell-Dubilier Electronics Superfund Site. Garth Anderson is the USACE-KC Project Manager. Malcolm Pirnie will be the primary contractor and will be responsible for developing and implementing the investigation and will provide project management to other subcontractors. Additional project team members from other companies may be subcontracted to Malcolm Pirnie.

Project Officer – The Project Officer (PO) has the final responsibility for the quality of work performed under the contract. The Project Officer is responsible for the commitment of resources required to fulfill Malcolm Pirnie's obligation to the USACE.

Project Manager – The Project Manager (PM) is accountable to the Project Officer throughout the duration of the project. The PM will be the primary point of contact with the USACE. The PM may delegate authority to expedite and facilitate the implementation of the project plan. The PM is responsible for:

- Coordination with the USACE;

- Budget control;
- Subcontractor performance;
- Project coordination to implement Work Plans;
- Allocation of staffing and resources to implement the QA/QC program and the Site Safety and Health Plan (SSHP); and
- Review of engineering and interim reports.

Deputy Project Manager – The Deputy Project Manager (DPM) reports directly to, and works with, the Project Manager. The DPM is responsible for assisting the Project Manager, as needed, with project related issues.

Project Quality Consultants – The Project Quality Consultants (QCs) are responsible for independent reviews of project quality. The QCs are integral to the project success by performing technical reviews throughout all project phases and offering technical guidance.

Corporate Health and Safety Manager – The Corporate Health and Safety Manager (CHSM) is responsible for development and implementation of Malcolm Pirnie's Health and Safety program. The CHSM functions as a liaison with the USACE, OSHA, and other agencies on health and safety issues.

The CHSM serves as the administrator of Malcolm Pirnie's Corporate Health and Safety program. He is responsible for:

- Proper training for Malcolm Pirnie field personnel;
- Medical clearance of Malcolm Pirnie field personnel;
- Field personnel having adequate experience with personal protective equipment;
- Providing guidance on data interpretation; and
- Determining levels of worker protection.

Project Quality Control Manager – The Project Quality Control (QC) Manager is responsible for project specific supervision, monitoring of the QA program, and maintaining the QAPP. Additional responsibilities include:

- Ensuring that field personnel are familiar with and adhere to proper sampling procedures, field measurement techniques, sample identification and chain-of-custody procedures;
- Coordinating with the analytical laboratory for the receipt of samples, the reporting of analytical results and recommending corrective actions to correct deficiencies in the analytical protocol or sampling; and
- Preparing QA reports to management.

Data Validator(s) – The Data Validator(s) will be responsible for validating nonCLP laboratory data. They will also be responsible for writing validation reports as well as making data changes and assigning data qualifiers to the data. The primary Malcolm Pirnie data validator, has years of experience performing data validation on numerous projects and has successfully completed Region II training programs in both Inorganic and Organic data validation. If she is unable to validate all the data for any reason an equally qualified data validator will be utilized.

Work Plans/Reporting Leader – the Work Plans/Reporting Leader is responsible for the coordination and assembly of Work Plans and data reporting for OU-2 Field Activities.

Health and Safety QA/QC Officer -- The Health and Safety QA/QC Officer is responsible for assisting the CHSM in responding to inquiries from the project team on Health & Safety issues. The Business Unit Safety Leader may also be designated by the CHSM to conduct periodic site audits or additional Health & Safety Training as necessary.

Project Safety Officer – The Project Safety Officer (PSO) is knowledgeable in safety and worker protection techniques as they relate to the project. Responsibilities include monitoring daily compliance of site work to the SSHP, having the ability and authority to make needed changes or additions to the SSHP and providing technical assistance to the Project Manager on problems relating to work site safety.

The PSO is responsible for the development and set-up of emergency procedures and personnel decontamination procedures. The PSO or designee will complete a daily diary of activities with

health and safety relevance. If unsafe work conditions are encountered, the PSO is authorized to stop work. Resolution of all on-site health and safety problems will be coordinated through the Project Manager with assistance from the CHSM.

Field Team Leader – The Field Team Leader will serve as the on-Site contact person for Malcolm Pirnie for field investigations and activities. The coordinator will be responsible for the logistics of the field activities. The Field Team Leader will:

- Inspect and replace equipment;
- Prepare interim field reports;
- Prepare samples for shipment:
- Coordinate field activities; and
- Schedule sampling and other field activities.

Sample Management Officer – The Sample Management Officer (SMO) will be responsible for oversight of the sample labeling, packaging and handling. The SMO will ensure that Chain of Custody (COC) procedures document pertinent sampling data and all transfers of custody until the samples reach the analytical laboratory.

1.3 PROBLEM DEFINITION/BACKGROUND

The buildings at the Cornell-Dubilier Superfund Site may contain building material which may require regulation when disposed of. They may contain asbestos, PCBs, and heavy metals. See Figure 2 for the Site Location Map and Figure 3 for the Site Plan. A full description of the site background is given in the Buildings FSP.

1.4 PROJECT/TASK DESCRIPTION

1.4.1 Task Description

The project will include the sampling and analysis of building materials for constituents of potential concern (COPCs). A full description of the project tasks and sampling activities are given in the Buildings FSP.

1.4.2 Work Schedule

The sampling program will commence by approximately early 2006, prior to building demolition. The project schedule will updated regularly based on discussions with the project team members (i.e., USACE, USEPA, and subcontractors) as well as the effect of seasonal and weather considerations on field sampling activities.

1.5 QUALITY OBJECTIVES AND CRITERIA

This section discusses the performance, measurement, and acceptance criteria for the data to be collected for this project. As such, it includes the following sections:

- Project Data Quality Objectives.
- Precision, Accuracy, Representativeness, Completeness, and Comparability.
- Desired Method Sensitivity, including action levels (ALs) and reporting limits (RLs) for the parameters of interest.

1.5.1 Project Data Quality Objectives

The overall QA objective is to develop and implement procedures for field sampling, chain of custody, laboratory analysis, and reporting that will provide scientifically sound results (i.e., data of known and documented quality that are adequate for their intended use) that can be used to make defensible decisions. In this section, the QA objectives that are required for the data collected during the Cornell-Dubilier Electronics Superfund Site investigation activities are developed and specifically identified. The Date Quality Objective (DQO) process, which is a systematic planning process, takes into consideration the intended data use, the available laboratory and field analysis procedures, and the available resources. The end result of this process is the development of quality requirements for each data collection activity. The DQOs for the project are documented in Attachment 1. Based upon these DQOs, analytical methods that are capable of supporting the DQOs which were selected (refer to Section 2.4 Analytical Methods). The QA objectives for the analytical methods were also determined (refer to Section 2.5 Quality Control).

The problem statement in DQO Step 1 (Section 1.0, Attachment 1) centers on the following objectives of the Cornell-Dubilier Electronics Superfund Site investigation activities:

- To characterize the nature and extent of COPCs in the facility building materials for the purposes of building demolition.

- To determine which and what building materials can be disposed of as hazardous wastes and as regulated non-hazardous waste.

The following fundamental questions are identified, which will be answered during the investigation to meet these objectives (Section 2.0, Attachment 1):

- If we do not sample any building materials, will there be a significant risk in assuming that the building materials are hazardous and/or non-hazardous for disposal?
- Are there sufficient data from previous investigations to make informed decisions for disposal?
- Are there building materials that need to be removed prior to demolition of the building(s)?
- What building materials may pose a health risk during building demolition activities?

1.5.2 Precision, Accuracy, Representativeness, Completeness, and Comparability

To measure and control the quality of analyses, certain QA parameters are defined and utilized in data analysis activities. These parameters are defined below. The QA/QC required for the parameters to be analyzed under the USEPA CLP is contained in the sections of the USEPA CLP Statement of Work (SOW). The required QA/QC for the non-CLP laboratory test methods including the frequency, RL, and required actions to be taken if QC criteria are not met are given in Attachment 2. Detailed information on the CLP methods and QA/QC criteria can be found in the USEPA CLP SOW found on the USEPA CLP website at http://www.epa.gov/superfund/programs/clp/.

Precision

Precision measures the reproducibility of data or measurements under specific conditions. Precision is a quantitative measure of the variability of a group of data compared to their average value. Duplicate precision is stated in terms of relative percent difference (RPD) or absolute difference between two measurements. Measurement of precision is dependent upon sampling technique and analytical method. Field duplicate and laboratory duplicate samples will be used to measure precision for project samples. Both sampling and analysis will be as consistent as

possible. For a pair of measurements, RPD (or absolute difference) will be used, as presented below:

$$RPD(\%) = \frac{|D_1 - D_2|}{\left[\frac{(D_1 + D_2)}{2}\right]} \times 100$$

where: D1 and D2 = the two replicate values.

RPD will meet EPA CLP requirements, when applicable, or the QA requirements listed in Attachment 2.

Accuracy

Accuracy measures the bias in a measurement system. Sources of error include the sampling process, field contamination, preservation, handling, shipping, sample matrix, sample preparation, and analysis technique. Analytical accuracy will be assessed through surrogate spike, matrix spike, laboratory control and/or quality check samples, where applicable. In general, accuracy is measured in terms of percent recovery (%R):

$$\%R = \frac{(SSR - SR)}{SA} \times 100$$

where: SSR = spike sample result
SR = sample result
SA = spike added to spiking matrix

Refer to Attachment 2 and the CLP SOW for the laboratory analytical method accuracy requirements.

Representativeness

Representativeness expresses the degree to which data accurately and precisely reflect a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon

the proper design and implementation of the sampling program and proper laboratory protocol. The sampling design created for this project was designed to provide data representative of site conditions. During the development of the sampling designs, consideration was given to the past history of contamination in the study area, existing analytical data, physical setting, and processes. Representativeness will be satisfied by determining that the Buildings FSP is followed, proper sampling techniques, preservation, and handling are used, proper analytical procedures are followed, and holding times for the samples are not exceeded in the laboratory.

Completeness

Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the laboratories used for this project will provide data that meet the QC acceptance criteria for 90 percent or more of all samples analyzed. Following the completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness } (\%) = \frac{\text{number of usable data}}{\text{number of samples collected for each parameter analyzed}} \times 100$$

The data validation process will be used to determine the quality and quantity of usable analytical data generated.

The completeness acceptance criterion for samples collected in the field will be 95 percent of the quantity of samples planned for collection in the Buildings FSP. Corrective action may be implemented to re-collect samples where necessary and possible (*e.g.*, modifying a planned sample location, sample jars broken during shipment). Laboratory notification sample receipt and conditions will be used to determine, as soon as possible, whether any problems during sample shipment would necessitate recollection of samples.

Comparability

Comparability expresses the confidence with which one data set can be compared to another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned

analytical data are expected to provide comparable data. The procedures used will be USEPA-promulgated methodologies, which are well recognized and commonly used for environmental investigations.

1.5.3 Desired Method Sensitivity

This section discusses measurement performance criteria and desired method sensitivity. Depending on the use of the data, specific reporting limits (RLs) will be required for each parameter. To establish RL requirements, certain terms must first be defined:

- Method Detection Limit (MDL): The MDL is the concentration of a particular compound that can be detected by a particular method. The concentration must be greater than zero and the compound must be detected with at least a 99% confidence level that the compound is present. The laboratory MDL must be low enough to support the RL for the test parameter.

- RL: The RL is the lowest concentration typically reported for a specific compound in a sample after corrections have been made for dilution factors, weight/volume of sample aliquot tested, and percent moisture (for solid samples). Note that in some instances laboratories are able to report values below the RL; these concentrations are qualified to further denote data usability below the RL. It should be noted that RLs are highly dependent on matrix effects.

Some of the building material test data will be obtained through the USEPA CLP or through USEPA's DESA laboratory. The USEPA CLP has extensive quality assurance requirements to document data quality and assist laboratories to produce data that are technically sound. The RL (known as the "Contract Required Quantitation Limits" or CRQL under the USEPA CLP) for these data will be based upon the USEPA CLP capabilities.

Tables 1 through 4 list the target RLs and regulatory/action limits for the analyses of building material that will be sampled. The inorganics include Target Analyte List (TAL) metals, Toxicity Characteristic Leaching Procedure (TCLP) metals, and asbestos. The organics include PCBs (Aroclors). The RLs presented in this QAPP were selected to address disposal regulations and human health risk action limits in a technically sound and reasonable manner.

1.6 SPECIAL TRAINING AND CERTIFICATIONS

Any specialized training requirements necessary to complete the project will be documented to ensure that the specific skills have been obtained, verified, and updated as necessary.

1.6.1 Training

Required training will be documented for all personnel, including subcontractors, performing functions requiring training. Project-specific health and safety training, such as training mandated by Occupational Safety and Health Administration (OSHA) regulations, training for shipping hazardous materials mandated by the Department of Transportation (DOT), and/or others will be obtained as specified within the Project Site Safety and Health Plan.

1.6.2 Certification

Training and certification will be obtained, wherever necessary, for personnel prior to their involvement in the field sampling activities. No person will be allowed to perform tasks that require specific training without a current certification.

1.7 DOCUMENTS AND RECORDS

Hard copies of all documents, records and data associated with the field activities will be kept on file by Malcolm Pirnie Inc. An electronic database will be created to share records and files among project team members.

The subcontract laboratories must keep records on file of both raw and processed data generated for the samples submitted. The laboratories' data record keeping procedures must be documented in the laboratory quality manual. Further details concerning the project Documents and Records requirements are also discussed in Section 2.10 Data Management.

2.0 DATA GENERATION AND ACQUISITION

This group of quality elements addresses measurement system design and implementation, including appropriate methods for sampling, analysis, data handling, and QC documentation.

2.1 SAMPLING PROCESS DESIGN

Environmental sampling includes the collection of building materials samples as described in the Cornell-Dubilier Electronics Superfund Site Buildings FSP.

2.2 SAMPLING METHODS

The sampling procedures for the collection of building material samples are provided in the Cornell-Dubilier Electronics Superfund Site Buildings FSP.

2.3 SAMPLE HANDLING AND CUSTODY

Sample custody procedures ensure the timely, correct, and complete analysis of each sample for all parameters requested. A sample is considered to be in someone's custody if it:

- Is in his/her possession
- Is in his/her view, after being in his/her possession
- Is in his/her possession and has been placed in a secured location
- Is in a designated secure area

Sample custody documentation provides a written record of sample collection and analysis. The sample custody procedures provide for specific identification of samples associated with an exact location, the recording of pertinent information associated with the sample, including time of sample collection and any preservation techniques, and a Chain of Custody (COC) record which serves as physical evidence of sample custody. Custody procedures will be similar to the procedures outlined in the USACE's Requirements for the Preparation of Sampling and Analysis Plans (USACE, 2001) and the USEPA's Contract Laboratory Program Guidance for Field Samplers (USEPA, 2004). The COC documentation system provides the means to individually identify, track, and monitor each sample from the time of collection through final

data reporting. Sample custody procedures are developed in three areas: sample collection, laboratory analysis, and final evidence files, which are described below.

2.3.1 Field Sample Handling and Custody

Field records provide a means of recording information for each field activity performed at the site. COC procedures document pertinent sampling data and all transfers of custody until the samples reach the analytical laboratory. The sample packaging and shipment procedures summarized below will ensure that the samples arrive at the laboratory with the COC intact. Refer to Standard Operating Procedure (SOP) No. 1 in Attachment 3 for sample management information, and SOP No. 2 in Attachment 4 for sample preservation procedures. Table 5 lists the specific sample preservation requirements for each test method.

2.3.2 Field Procedures

More detailed descriptions of the field procedures are presented in the Site Buildings FSP. The general responsibilities of the field team are listed below:

- The field sampler is personally responsible for the care and custody of the samples until they are transferred to the Sample Management Officer (SMO) or until they are properly dispatched. As few people as possible should handle the samples.

- The Field Team Leader, or designee, is responsible for entering the proper information in the field logbook, including all pertinent information such as sample identification number, date and time of sample collection, type of analysis, and description of sample location. The information entered into the field logbook will be used to generate a COC.

- All sample containers will be labeled with the project identification, sample number, matrix, type of analysis required, and preservation requirements.

- The samples will be properly preserved, bagged, and packed into coolers. The original COC form will be placed into the lead cooler and will be shipped to the laboratory.

- The Project QC Manager or his designee will review all field activities to determine whether proper custody procedures were followed during the field work and if additional samples are required.

2.3.3 Field Records

Refer to the Buildings FSP for the procedure on documenting field activities. The field logbook will provide the means of recording data collection activities. Entries will be described in as much detail as possible so that persons going to the site can reconstruct a particular situation without reliance on memory. At the beginning of each day, the date, start time, weather, and names of all sampling team members present will be entered. The names of visitors to the site and the purpose of their visit will also be recorded. All field measurements, as well as the instrument(s), will be noted.

Samples will be collected following the sampling procedures documented in the Buildings FSP. Observations such as sampling conditions or any problems will also be recorded. Sample identification numbers will be assigned at the time the data are entered in the logbook. Field duplicate samples, which will receive a unique sample identification number, are "blind" to the laboratory and will be identified under the sample description so that they can be associated with their respective samples by project staff. Laboratory duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples for cores will not be noted in the field logbook, as they will be collected after pulverization of the core in the analytical laboratory.

2.3.4 Sample Identification

- The documentation system for laboratory samples is described in the Buildings FSP Section 6.4.1.

2.3.5 Chain of Custody Procedure

If samples are going to be submitted to an EPA-CLP laboratory, the COC should be generated as per EPA's FORMS II Lite. The following information should be recorded on the COC form and the forms signed in ink:

- Project name and/or project number
- Signature of SMO or designee
- Sampling station number

- Date and time of collection
- Grab or composite sample designation
- Sample matrix
- Sampling location description
- Field identification number
- Analyses required
- Preservation technique
- Signatures and dates for transfers of custody
- Air express/shipper's bill of lading identification numbers

Example COC forms for CLP and non-CLP samples are presented in Attachment 5.

The COC form serves as an official communication to the laboratory detailing the particular analyses required for each sample. The COC record will accompany the samples from the time of sampling through all transfers of custody. It will be kept on file at the laboratory where samples are analyzed and archived. Three copies of the COC form are created; one copy is retained by the Field Team Leader and two are sent to the laboratory. The SMO or designee completes a COC record to accompany each shipment from the field to the laboratory. The completed COC is sealed in a zip-lock bag and taped to the inside cover of the sample shipping container. If there is more than one container in a shipment, copies of the COC forms will be placed in each container. The container is then sealed with custody seals and custody is transferred to the laboratory.

2.3.6 Transfer of Custody and Shipment

The custody of samples must be maintained from the time of sampling through shipment and relinquishment to the laboratory. Instructions for transferring custody are given below:

- All samples are accompanied by a COC. When transferring custody of samples, the individuals relinquishing and receiving will sign, date, and note the time on the COC. This form documents sample custody transfer from the SMO or designee, through the shipper, to the analytical laboratory. Since a common carrier will usually not accept

responsibility for handling COC forms, the name of the carrier is entered under "Received by," the bill-of-lading number is recorded in the comments section, and the COC form is placed in a zip-lock plastic bag and taped to the inside lid of the lead shipping cooler. Copies of the COC forms will be placed in each additional cooler in a shipment.

- Samples will be packaged for shipment and either picked up at the site by the laboratory or dispatched to the appropriate laboratory via overnight delivery service. SOP No. 1 in Attachment 3 contains the proper sample packaging techniques. A separate COC record must accompany each shipment. Shipping containers will be sealed for shipment to the laboratory. Two custody seals will be applied to each cooler to document that the container was properly sealed and to determine if the container was tampered with during shipment. The custody seals will be placed on the coolers in such a manner that the custody seal would be broken if the cooler were opened (i.e., diagonally opposite corners of the cooler lid).

- The original COC (and a copy for CLP laboratories) will accompany the shipment. A copy will be retained by the Field Team Leader.

- If the samples are sent by common carrier or air freight, proper documentation must be maintained. For example, the bill of lading must be retained by the Field Team Leader.

2.3.7 Laboratory Custody Procedures

The laboratory custody procedures will be equivalent to those described in the latest edition of the CLP SOW. The following will be addressed in the laboratory custody SOPs:

- A designated sample custodian accepts custody of the samples and verifies that the information on the sample labels matches the information on the COC. The sample custodian will document any discrepancies and will sign and date all appropriate receiving documents. The sample custodian will also document the condition of the samples upon receipt at the laboratory. The CLP laboratories will send a copy of the

sample receipt checklist to USEPA's RSCC, while the subcontract laboratories will complete the form and return it electronically.

- Once the samples have been accepted by the laboratory, checked and logged in, they must be maintained in accordance with laboratory custody and security requirements.

- To ensure traceability of samples while in the possession of the laboratory, a method for sample identification that has been documented in a laboratory SOP will be used to assign sample numbers.

- The following stages of analysis must be documented by the laboratory:
    - Sample Extraction/Preparation
    - Sample Analysis
    - Data Reduction
    - Data Reporting

- Laboratory personnel are responsible for the custody of samples until they are returned to the sample custodian.

- When sample analyses and QA checks have been completed in the laboratory, the used portion of the sample must be stored or disposed of in accordance with the protocols specified in the CLP SOW or the subcontract agreement. Identifying labels, data sheets, COCs, and laboratory records will be retained until analyses and QA checks are completed in accordance with the protocols specified in the CLP SOW or the subcontract agreement.

2.3.8 Final Evidence Files

This is the final phase of sample custody. The COC records and sample analysis request form copies are archived in their respective project files. Laboratory custody forms, sample preparation and analysis logbooks, and data packages will become part of the laboratory final evidence file. Other relevant documentation including records, reports, and correspondence, logs, pictures, and data review reports will be archived by Malcolm Pirnie.

2.3.9 Sample Holding Times

Information on sample holding times and required preservation for each test method are provided in Table 5.

2.4 ANALYTICAL METHODS

All samples collected during field sampling activities for the project will be analyzed either through the USEPA CLP program, the USEPA DESA Lab, or via subcontract commercial laboratories. The analysis will be performed by laboratories qualified in the analytical methods and, where applicable, certified through the programs listed below:

- NJDEP
- NJDEP through the National Environmental Laboratory Accreditation Program (NELAP)
- USEPA CLP
- USACE

Each subcontract laboratory utilized for the project will undergo an evaluation to determine if their experience and capability in the requested analytical methods are appropriate for the project. The subcontract laboratories, who will perform the non-CLP analysis, must be certified in accordance with the New Jersey Department of Environmental Protection (NJDEP) requirements found in (New Jersey Administrative Code (NJAC) 7:26E-2.1 (a)1.

The laboratory selected to analyze the asbestos samples must be accredited by the American Industrial Hygiene Association (AIHA), and certified by the National Voluntary Laboratory Accreditation Program (NVALP). The laboratory (ies) selected for analysis of the core samples will be responsible for pulverization of the cores to obtain sample aliquots. When possible, the test methods selected were either USEPA methods or national consensus methods, such as those published by ASTM.

The analytical methods were selected based on the DQOs established for the project. Depending on the use of the data, different analytical methods may be required for the same parameters.

The following subsections are descriptions of the techniques proposed for the key laboratory analytical methods. Depending on the capabilities of laboratories employed to support the project, modifications may be made to the specific test methods and quality assurances described herein so long as the data quality is sufficient to meet project objectives, and all modifications are documented and approved by the Project QC Manager.

The normal requested laboratory turn-around times (TATs) for CLP laboratories for this project will be 21 days Requested TATs for the non-CLP test methods for the majority of the requested analyses will be within 35 weekdays of receipt of the sample. Quicker TATs may be requested for specific samples, as appropriate.

2.4.1 Metals Methods

Methods for the metals analyses are listed in Table 6. Materials will be analyzed for the Target Analyte List ((TAL 23 metals) by SW-846 Method 6010B and for the eight RCRA TCLP metals by SW-846 Methods 6010B/7470A/7471A by Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). Total mercury will be determined by SW-846 7470A/7471A employing Cold Vapor Atomic Adsorption (CVAA). Extraction for TCLP metals will by Method SW-846-1311.

Depending upon the lab performing the analyses, metals analyses may also be performed by the methodology described in USEPA CLP Multi-Media, Multi-Concentration, Inorganic Analytical Services for Superfund (ILM05.3 or the latest CLP SOW) or the equivalent USEPA DESA Laboratory SOW.

2.4.2 PCB (Polychlorinated Biphenyl) Aroclor Method

The method specified for analysis of PCB Aroclors in building materials will be analyzed by Gas Chromatography (GC) coupled to an Electron Capture Detector (ECD) by USEPA Method SW-846-8082, the methodology described in the EPA SOW for Organic Analysis Multi-Media, Multi-Concentration (OLM04.3/SOM01.4 or the latest CLP SOW), or the equivalent USEPA DESA Laboratory SOW.

2.4.3 Asbestos Analysis

Method for asbestos analysis is described in the Buildings FSP and is based upon the polarized light microscopy (PLM) method described in the Buildings FSP and USEPA Method

600/R-93/116 Method for the Determination of Bulk Building Materials and CFR 40, 763 Subpart E.

2.5 QUALITY CONTROL

To monitor the quality of the data generated for this project, an appropriate number and type of QC procedures will be employed for each measurement. The employment of QC procedures permits the validation of the method and provides a measure of the ability of the particular system being used to meet the DQOs established for each measurement or analysis. Once the measurement or analysis has begun, the employment of QC procedures permits the monitoring of the system output for quality. The QC results, presented along with the reported data, allow the data to be assessed for quality and, with other factors, allow a determination to be made on how well the data have met the DQOs. In general, laboratory QC programs are more rigorous than field QC programs. The type and frequency of the individual QC for the CLP analytical methods are given in the CLP SOW; for the non-CLP parameters this information is contained in the tables in Attachment 2 and the Buildings FSP.

2.5.1 Laboratory Quality Control

Both CLP and non-CLP laboratories will likely be employed for this project. Procurement of the non-CLP laboratories will be conducted to ensure that qualified, experienced laboratories are retained. Procurement and tracking of these analytical services will be conducted in accordance with the following:

- Region 2 SOP No. HW-32, Standard Operating Procedure For Implementing The National Strategy For Procuring Analytical Services for All OSWER Programs, Revision 5, March 17, 2005.

- Directive # 9240.0-2C: Tracking Superfund Non-CLP Analytical data, Michael B. Cook, Director, Office of Emergency and Remedial Response. November 14, 2002.

2.5.2 CLP Laboratory Quality Control

All samples being analyzed through USEPA's CLP program will be analyzed following the QC methods described in the most recent CLP documents:

- USEPA Contract Laboratory Program, Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration (OLM04.3 or SOM01.0), Exhibit E: Quality Assurance/Quality Control Procedure and Requirements. October 2004 or May 2005, respectively, or their latest revision.

- USEPA Contract Laboratory Program, Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration (ILM05.3), Exhibit E: Contract Laboratory Program Quality Assurance Monitoring Plan. March 2004, or the latest revision.

2.5.3 Non-CLP Quality Control

For the non-CLP laboratories, a SOW was developed that lists each analytical method along with the required RLs and QC. Refer to the tables in Attachment 2 for the minimum non-CLP laboratory QC requirements.

Prior to selecting any subcontract commercial laboratories, certain minimum requirements will have to be met. Each laboratory will be selected based on an objective, qualifications-based evaluation. The qualifications considered in this evaluation will include, but will not be not limited to, the following:

- Documentation that the laboratory has the appropriate certifications/accreditations
- Documentation that the laboratory has met the analytical method's specific performance criteria requirements
- Documentation that the laboratory has conducted a determination of the method detection limit, as described by the analytical method, where appropriate
- Each analyst must have completed a demonstration of capability prior to analyzing environmental samples. If modifications are made to a method protocol which could change detection limits, the initial demonstration of capability must be repeated.

- Each laboratory must maintain a formal in-house QA/QC program to which they adhere.
- Each laboratory must demonstrate that they adhere to their own SOPs.
- The laboratory must demonstrate that the ability to meet the sample capacity and turnaround time requirements.
- The subcontract laboratories chosen for this project must be certified as appropriate in accordance with the New Jersey Department of Environmental Protection (NJDEP) requirements found in (New Jersey Administrative Code (NJAC) 7:26E-2.1 (a)1.

Malcolm Pirnie will monitor to determine that the laboratories are in compliance with the SOWs through the data validation process (refer to Section 4 – Data Validation and Usability, of this QAPP).

2.6 PREVENTATIVE MAINTENANCE AND INSTRUMENT CALIBRATION

When collecting field measurements or analyzing data, only calibrated instruments will be used. Instruments must be properly calibrated to produce technically valid data. Documentation of calibration and response check results verifies that the instruments used for measurement are in proper working order and the data produced are reliable. The calibration requirements described below are necessary to support the DQOs for this project. Calibration of field instruments will be documented in the field notebook.

The purpose of a preventative maintenance program is to keep the calibrated sampling, field testing, and analytical equipment working properly, confirm proper performance, avoid erroneous results, and minimize equipment downtime. The preventative maintenance program also provides for the documentation of all maintenance to be used as evidence of instrument maintenance and for scheduling future maintenance. The laboratory preventative maintenance program is the responsibility of the laboratory and only the minimum requirements are mentioned here.

2.6.1 Field Instruments

To confirm that equipment is working properly, and to avoid erroneous results, these instruments will be maintained under the preventative maintenance program described below or in the Buildings FSP, whichever is more stringent.

- On at least an annual basis (if applicable) or per manufacturer's requirements, equipment will be calibrated by the manufacturer or other qualified facility. The calibration records will be maintained in the site files.
- At a minimum, instruments will have a battery and response check at the start of each day, before measurements are made, and at the end of each day, after all measurements are complete. Any response checks conducted by the field crew will be recorded in the field logbook. If the initial response check indicates a problem with the instrument, it will not be used in the field until the problem is corrected. If the end of the day response check indicates a problem with the instrument, the preceding sample results will be reviewed for validity and reanalyzed as necessary. Field calibration will be conducted at the interval recommended by the manufacturer.
- Minor service and repair will be done by the Malcolm Pirnie Equipment Manager, who is trained in the service and repair of field instruments. Equipment in need of major or more complex repair and services will be sent to the manufacturer or other qualified facility. All maintenance, servicing, and repair will be recorded and kept on file. Field personnel will record maintenance and instrument problems in the field logbook. The Equipment Manager will keep a record of all equipment released to the field and a record of all maintenance and service on file.
- Normal upkeep will be conducted daily after each use and includes inspection for damage and signs of problems and will include, as appropriate:
    - Cleaning
    - Inspect for damage
    - Check for operation problems
    - Recharge

- Information to be recorded during a field calibration or response check could include, as applicable, date and time, technician name, field calibration or response check results, observations and problems, and instrument serial numbers.
- All calibration standards will be traceable to acceptable sources. Only personnel proficient in the use of the field instruments will operate them.

If any of the equipment used for this project is rental equipment, it must be demonstrated that the rented equipment will be able to meet the DQOs of the data collection activity for which the equipment is being used. As a result, the equipment supplier will be required to provide adequate documentation of the accuracy, maintenance, and upkeep of the rented equipment that will enable the DQOs to be met.

2.6.2 Laboratory Instruments

The primary goal of the project laboratories' preventive maintenance programs will be to prevent instrument and equipment failure whenever possible, and to minimize instrument downtime when failures occur. The laboratories selected will have instrumentation redundancies and will maintain an inventory of the replacement parts needed for preventative maintenance and spare parts that routinely need replacement. Implementation and documentation of the preventive maintenance program will be the responsibility of the analytical group using the instrument according to the policies in the Laboratory Quality Manual, or equivalent. If an instrument failure impedes sample analysis, the laboratory will notify the Project QC Manager of the problem so corrective actions can be implemented, including sample capacity management.

2.7 LABORATORY INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

All samples collected for this project will be analyzed according to specific USEPA or other established procedures. The preventative maintenance and calibration procedures and frequencies for these analyses are detailed in each applicable analytical method. All calibration results will be received from the laboratory as part of the data package deliverable and they will be kept in the site file and verified as part of the data validation process. For the non-CLP laboratories, additional calibration information is referenced in Attachment 2. Instrument maintenance activities, either preventative or repair, will be documented on standard forms or

logbooks. Written procedures will include maintenance procedures, problem identification procedures, problem identification and repair documentation procedures, and failure analysis protocols. Service contracts and regularly scheduled in-house maintenance will be included, along with a list of critical spare parts. In the event a piece of equipment breaks down for an extended period of time, the laboratory will have sufficient backup equipment to complete the analyses within holding time requirements.

2.8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

All supplies and consumables used for this investigation will be obtained through appropriate suppliers and will meet any applicable supply-specific requirements. All supplies and consumables will be inspected prior to use. Any product that does not meet applicable requirements will be returned to the supplier for replacement or will be discarded. Supply-specific requirements include, but are not limited to, the following:

- Blank water will be certified analyte-free and analytical results will be provided for each lot.
- Decontamination and preservation chemicals will be ultra-pure grade or pesticide-grade, as applicable. Certifications will be obtained from the supplier.
- Sampling equipment will be constructed of approved materials.

2.9 NON-DIRECT MEASUREMENTS

Non-direct measurements that are to be used during the investigation will include the evaluation of historical data presented in the RI Report (Foster Wheeler, 2002). The details regarding the collection of these measurements are described in detail in the RI Report. The historic data in the RI will be examined to determine if it is valid. The valid data will then be compared to action levels for the parameters measured and evaluated to determine how much additional data is required to meet the project objectives. Additional samples will be collected and analyzed to supplement the historical data as described in the Buildings FSP.

2.10 DATA MANAGEMENT

This section describes the project data management process, tracing the path of the data from their generation to their final use or storage.

2.10.1 Data Recording

Data for this project will be collected by handwritten entries and possibly by computer. Field observations will be recorded in field logbooks, on the field instrument hard drive or on forms. Computer-generated data associated with laboratory analyses will be managed under the control of the subcontract laboratory's laboratory information management system (LIMS).

2.10.2 Data Quality Assurance Checks

Malcolm Pirnie will monitor the progress of sample collection to verify that samples are collected as planned. The progress of sample collection and processing will be monitored through documentation of the samples collected.

The contracted laboratory (either CLP or non-CLP) will have a formal in-house QA Plan to which it adheres and performs as part of daily operations. Data generation processes will be reviewed and modified to meet objectives, if necessary. A formalized data generation procedure will be utilized. Each analyst must have previously demonstrated, through the laboratory QA program, his or her ability to generate acceptable results within the requirements of the each method.

2.10.3 Laboratory Data Transmittal

Laboratory data are managed by the laboratory's LIMS system, beginning with sample check-in on the sample-receiving data terminal. For non-CLP laboratories, full laboratory data reports will be delivered to Malcolm Pirnie within 35 weekdays of the laboratory's receipt of the samples, and will include electronic data deliverables (EDDs). For CLP laboratories, third-party validated laboratory results will be received by Malcolm Pirnie through the EPA RSCC, and will include EDDs.

2.10.4 Data Storage and Retrieval

Paper copies of the forms, electronic copies of files, and the photographic log will be transmitted regularly to the Malcolm Pirnie PM. The completed forms and notebooks will be stored in the custody of the PM for the duration of the project. The full laboratory data reports submitted to Malcolm Pirnie will be stored in the custody of the Project QC Manager. The laboratory will maintain paper copies of documents and magnetic tape or other appropriate electronic backups of all data.

Hard copies of project files will be archived off-site at a secure facility and retained until the end of the contract; project closeout will be conducted in accordance with USEPA Close-out Guidelines.

Each laboratory shall archive, electronically, the sample analyses and submit the electronic data files along with the data deliverable package. In addition, each laboratory must submit instrument manufacturer, method files, and ID file information. Malcolm Pirnie must receive this information in the event a project lab closes or updates hardware/software.

3.0 ASSESSMENT AND OVERSIGHT

This element addresses assessment of the effectiveness of project implementation and associated QA/QC activities.

3.1 ASSESSMENT AND RESPONSE ACTIONS

To monitor the capability and performance of the Buildings FSP activities, several types of audits will be performed. These audits will be conducted by the Project QC Manager or designee. Performance audits (PAs) of laboratories are conducted to measure the accuracy of the measurement systems. Data Quality Audits (DQAs) are conducted to determine if the data generated by the sampling and analysis will satisfy the DQOs.

3.1.1 Field Corrective Actions

At the end of each sampling day, the sampling team is to report any problems requiring corrective action that were encountered during the day. Corrective action will be undertaken when a non-conforming condition is identified. A non-conforming condition occurs when QA objectives for precision, accuracy, completeness, representativeness, or comparability are not met, or when procedural practices or other conditions are not acceptable. A report is to be filed that documents the problems encountered and the corrective action implemented. A Stop-Work Order may be issued by the Project QC Manager, following notification to the PM, if corrective action does not adequately address a problem, or if no resolution can be reached.

3.1.2 Performance Audits

A performance audit (PA) consists of sending a laboratory a performance evaluation (PE) sample for analysis. The PE sample is a sample of known concentration, established by an independent party such as the National Institute of Standards and Technology (NIST), that is analyzed by the laboratory and the analytical results are compared with the certified concentration. The results provide a measure of laboratory performance that is used along with other QA criteria to monitor laboratory capability. At the current time, there are no plans to conduct a PA. Therefore, all chemical subcontract laboratories procured for this project must be NJDEP or federally-certified and are subject to the performance audits required by those programs.

3.1.3 Internal Laboratory Audits

As part of its QA program, the Laboratory Quality Assurance Manager (QAM) will conduct periodic checks and audits of the analytical systems to ensure that they are working properly and personnel are adhering to established procedures and documenting the required information. These checks and audits will also assist in determining where problems are occurring.

In addition to conducting internal reviews and audits as part of its established QA program, the laboratory is required to take part in regularly scheduled performance evaluations and laboratory audits from State and Federal agencies for applicable tests. Each laboratory selected to support this program must maintain current NJDEP or Federal certifications, as appropriate.

3.1.4 Laboratory Corrective Actions

If a particular laboratory analysis is deemed "out of control," corrective action will be taken by the laboratory to maintain continued data quality. Each laboratory must adhere to their in-house corrective action policy. The coordinator of the laboratory's analytical section will be responsible for initiating laboratory corrective action when necessary.

3.1.5 Data Quality Audits (DQAs)

DQAs are conducted to determine if the data are adequate to support the DQOs and to determine the cause of deficiencies in the event that the data quality is not adequate. This audit is conducted by the Project QC Manager after the data have been fully validated. The Project QC Manager will first determine to what extent the data can be used to support the decision making process. If the data are deficient, the Project QC Manager will identify the cause of the deficiency and will determine what modifications need to be made (*e.g.*, have the laboratory analyze a larger volume sample to lower the RLs so that subsequent data are acceptable.

3.2 REPORTS TO MANAGEMENT

The USACE PM and USEPA PM will receive several types of management reports, including the results of any corrective action reports and data validation reports. In addition, the progress report will contain a section on quality control reports. Problems or issues that arise between regular reporting periods may be identified to program management at any time. Information included in the progress report will include the following:

- Results of Technical System field audits conducted during the period;
- An assessment of any problems with the measurement data, including accuracy, precision, completeness, representativeness, and comparability;
- A listing of the non-conformance reports, including Stop-Work Orders issued during the period, related corrective actions undertaken, and an assessment of the results of these actions; and
- Identification of significant quality assurance problems and recommended solutions, as necessary.

4.0 DATA VALIDATION AND USABILITY

Data Validation and Usability assessments are conducted to determine if individual data elements conform to the specified criteria and to enable reconciliation with the project's objectives. This group of elements covers the QA activities that occur subsequent to the data collection phase of the project.

4.1 DATA REVIEW, VERIFICATION, AND VALIDATION

The selection of the type of environmental laboratory that the samples will be analyzed by to has not been finalized at the drafting of this QAPP. The selection will be determined by the capability and availability of laboratories associated with the USEPA Superfund Analytical Services/Contract Laboratory Program. The following subsections pertain to the different types of environmental laboratories and the requirement of data review, verification, and validation with respect to each of those types of laboratories.

4.1.1 USEPA CLP Data

Validation will be accomplished by comparing the contents of the data packages and QA/QC results to the requirements contained in the applicable analytical methods (SOWs), laboratory SOPs, and validation guidelines. All TAL/TCL data generated through the CLP will be validated by RSCC using the latest applicable USEPA Region 2 validation procedures in accordance to the following USEPA guidance documents or their most recent revisions, which can be found at http://www.epa.gov/superfund/programs/clp:

- USEPA CLP National Functional Guidelines for Organic Data Review, OSWER 9240.1-5A-P, October 1999.
- USEPA CLP DRAFT FINAL National Functional Guidelines for Superfund Organic Methods Data Review, OSWER 9240.1-46, EPA-540-R-04-00, January 2005
- USEPA CLP National Function Guidelines for Inorganic Data Review, OSWER 9240.1-45, October 2004.

4.1.2 USEPA DESA Laboratory Data

Data generated by the USEPA Region 2 DESA laboratory in Edison, NJ are considered USEPA-validated and are useable as reported. No third party data validation will be performed on DESA-generated data.

4.1.3 Commercial Subcontractor Laboratory Data

The commercial subcontractor laboratory data will be validated by Malcolm Pirnie or a qualified subcontractor. Parameters will be validated in accordance with the QC requirements of this QAPP, the USEPA's National Functional Guidelines, and applicable Region 2 guidelines. USEPA Region 2 follows the Standard Operating Procedures (SOPs) located at: http://www.epa.gov/region02/qa/documents.htm.

The validator will validate each sample delivery group (SDG) received for each subcontract lab analytical parameter. The validator will review the raw data and log book sheets, and will recalculate at least 10 percent of the sample and QC sample results. Once data validation is completed, a data validation report will be generated. The report will contain, when possible, information regarding the parameters that are qualified, the reason for the qualification, and the direction of the bias (only for parameters qualified as estimated). Based upon the quality assurance review of the analytical data, specific codes (data qualifiers or 'flags') will be placed next to results to provide an indication of the quantitative and qualitative reliability of the results.

Qualifiers assigned by laboratories will be defined by each laboratory in their data package and will be superseded by the data validator's qualifiers.

4.1.4 Field Data Evaluation

Procedures to evaluate field data for this program include review of the data entered into the field logbooks to ensure that errors have not been made. The field data documented includes data generated during measurement of field parameters, observations, results of any quality control sample analyses, and field instrument calibrations. This task will be the responsibility of the Project QC Manager or designee.

4.2 VERIFICATION AND VALIDATION METHODS

This section describes the process for verification (*i.e.*, determining that project data were collected in a way that meets at least the specified QC acceptance criteria) and validation (*i.e.*,

determining that the project results are suitable for use in making the specified decisions) of project data. The specific steps in each process are described below.

4.2.1 Data Verification

- The Field Team Leader or designee is required to review the log book entries for errors or omissions. This information is transmitted to the Project QC Manager or designee for correction.
- In addition, the Project QC Manager or designee is responsible for reviewing field data for completeness and to verify that the field crew followed the QC requirements detailed in this QAPP (e.g., the collection of QC samples at the required frequency, response checking the field instruments). If any problems with the information are found, the Project QC Manager or designee will document the problems.
- Once the Project QC Manager or designee reviews the field data, he/she signs the bottom of the field logbook page as reviewed and approved.

4.2.2 Data Validation

As described in Section 4.1, all laboratory data collected for this project will undergo validation. The following steps are involved in the data validation process:

- As environmental samples are collected, associated QC samples (e.g., field duplicates, rinsates) will also be collected.
- The data validator validates the data in accordance with the protocols outlined in Section 4.1. As part of the data validation process, the validator identifies any qualifications, the bias (if known) of the data, and the usability of the data. The validator applies qualifiers to the data.
- Once the validation package is received from the validator it is reviewed by the Project QC Manager or designee. Any problems with the validation will be discussed with the validator and resolved.
- A check will then be made to determine whether the completeness of the data is acceptable.
- The data users will use the data validation information when performing data evaluation and using the data.

4.3 RECONCILIATION WITH USER REQUIREMENTS

The Project QC Manager, in conjunction with the PM, will determine whether field and analytical data meet the requirements set forth for decision-making. The results of the measurements will be compared to the DQOs presented in Attachment 1 of this QAPP. As data are evaluated, anomalies in the data or data gaps may become apparent to the data users. Data that do not meet the DQOs will be identified and appropriately noted in the project database so data users are aware of any limitations or concerns with the usability of the data.

If systematic problems with the laboratory data are encountered, the Project QC Manager will review the data to determine whether the problems are field or laboratory related. If the problems are found to be associated with the field program, corrective action will be undertaken in accordance with the non-conformance procedures outlined in Section 6.1 of the Buildings FSP.

5.0 REFERENCES

40 CFR 61, National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart M – National Emissions Standards for Asbestos

40 CFR 763, Asbestos Hazard Emergency Response Act (ACHERA), Subpart E – Asbestos-Containing Materials in Schools

Chapter 7 HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

Foster Wheeler Environmental Corporation, 2002. Remedial Investigation Report for Operable Unit 2 Facility Soils and Buildings for Cornell-Dubilier Electronics Superfund Site. Final, December 2002.

Malcolm Pirnie, Inc., 2005. Cornell-Dubilier Project Field Sampling Plan. Draft, September 2005.

Malcolm Pirnie, Inc., 2005. Cornell-Dubilier Site Safety and Health Plan. September 2005.

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USEPA, 2004. Contract Laboratory Program Guidance for Field Samplers. 2004.

USEPA, 1996. SW-846, "Test Methods for Evaluating Solid Waste," including Promulgated Final Update III. 3rd Edition. December 1996.

USEPA, 2000. Guidance for the Data Quality Objectives Process, QA/G-4. August 2000.

USEPA, 2001. Requirements for Quality Assurance Project Plans. USEPA QA/R-5. March 2001.

USEPA, 2002. Guidance for Quality Assurance Project Plans. USEPA QA/G-5. December 2002.

USEPA, 2004. Contract Laboratory Program, Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration (ILM05.3), March 2004

USEPA, 2004. Contract Laboratory Program, Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration (OLM04.3), October 2004.

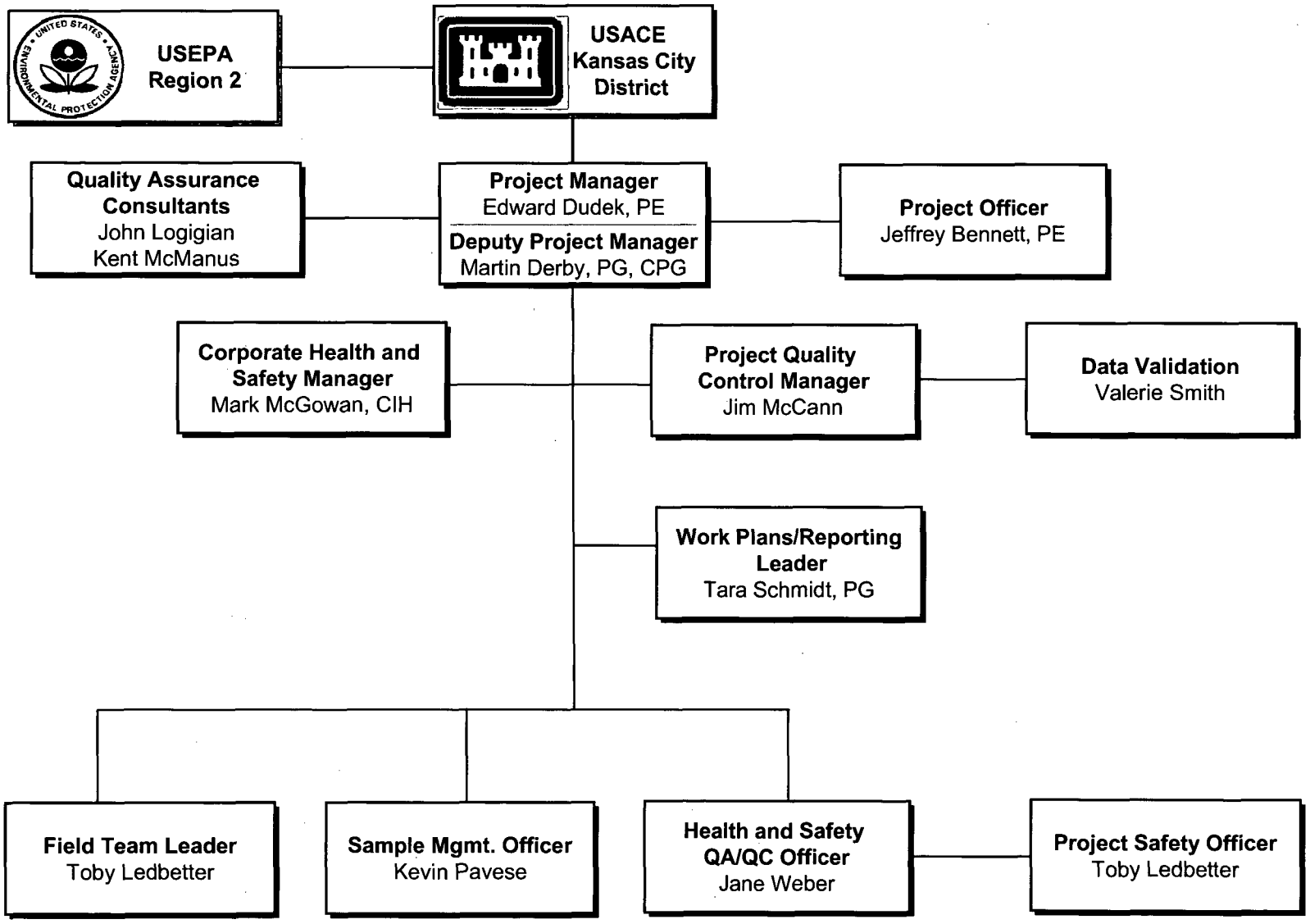
USEPA, 2005. Contract Laboratory Program, Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration (SOM01.1), May 2005.

USEPA, 2005, Region 2 SOP No. HW-32, Standard Operating Procedure For Implementing The National Strategy For Procuring Analytical Services for All OSWER Programs, Revision 5, March 17, 2005.

USEPA Method 600/R-93/116 Method for the Determination of Bulk Building Materials by Polarized Light Microscopy (PLM)

USEPA, 2000, EPA Data Quality Objectives Process for Hazardous Waste Site Investigations, EPA QA/G-4HW, January 2000, locatedhttp://www.epa.gov/qualityhttp://www.epa.gov/quality

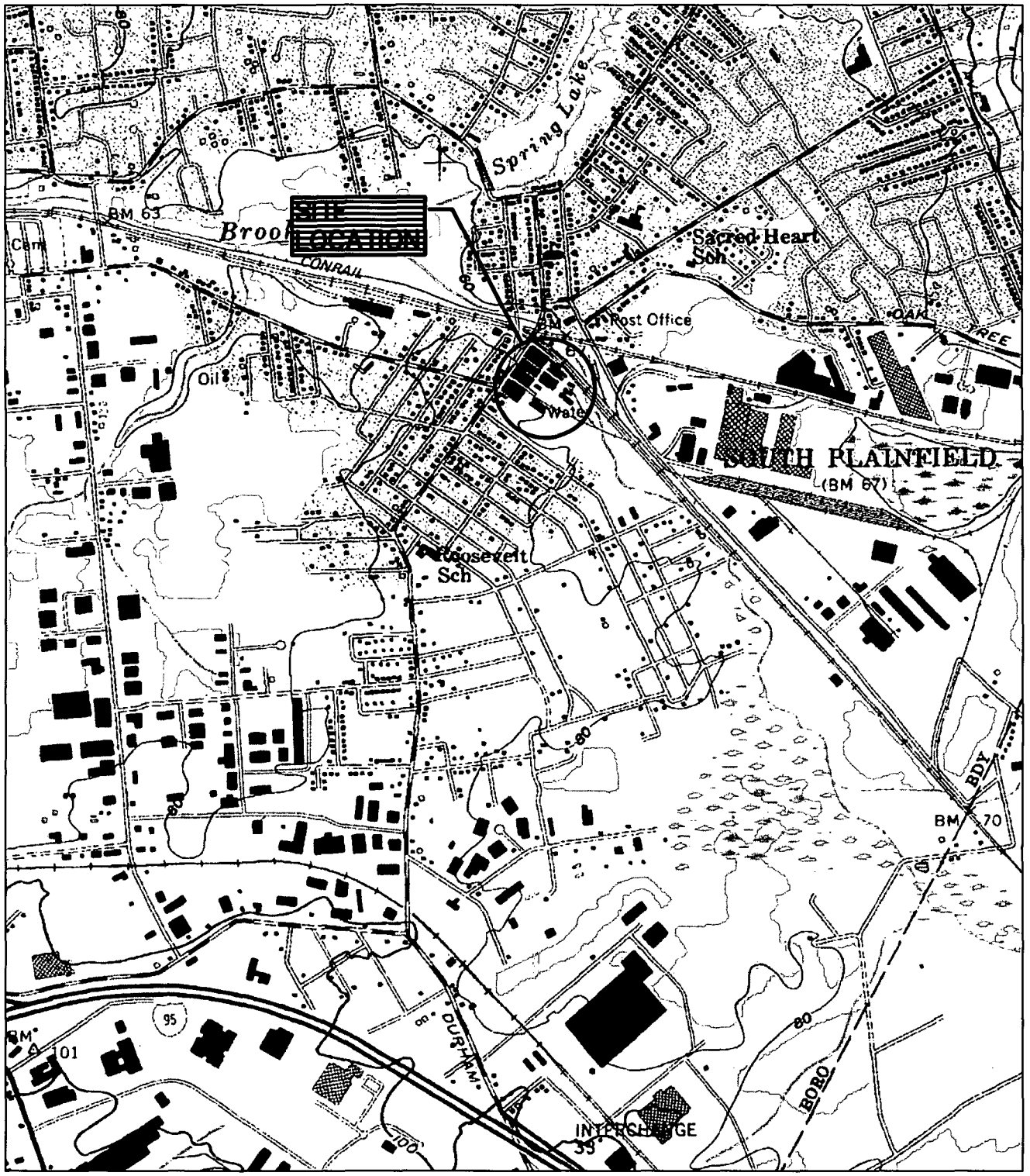
FIGURES



MALCOLM PIRNIE

Figure 1: Cornell-Dubilier Electronics Superfund Site Project Team Organization Chart

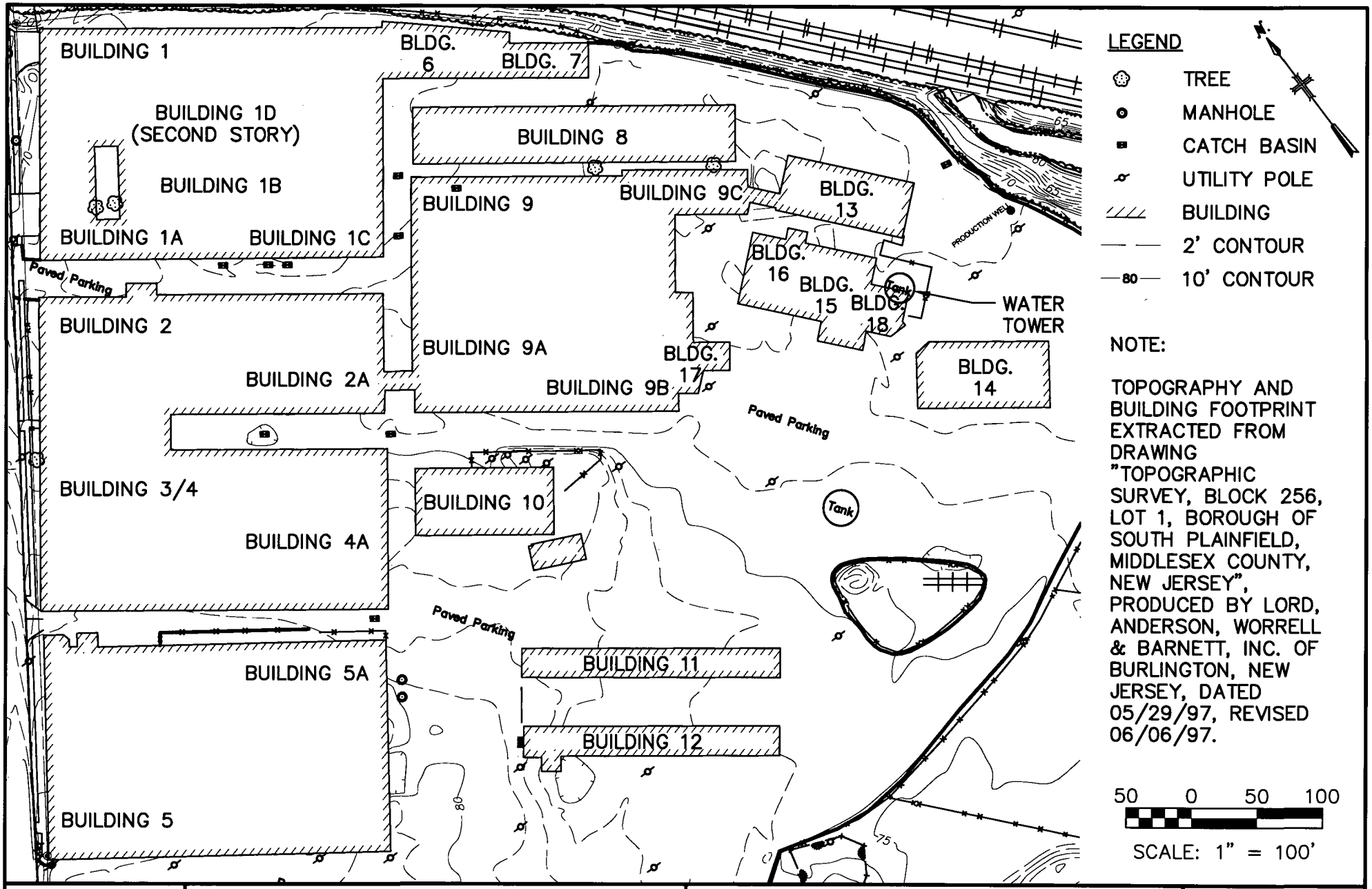
January 2006



SOURCE: U.S.G.S. TOPOGRAPHIC MAP,
7.5 MINUTE SERIES, PLAINFIELD, NEW JERSEY
QUADRANGLE, 1955, PHOTOREVISED 1981

REF:

MALCOLM PIRNIE	U.S. ARMY CORPS OF ENGINEERS CORNELL–DUBILIER SUPERFUND SITE SOUTH PLAINFIELD, NJ CONTRACT: DACW41–02–D–0003, TO 0034	SITE LOCATION MAP SCALE AS NOTED	MALCOLM PIRNIE, INC. SEPTEMBER 2005 FIGURE 2



MALCOLM PIRNIE

U.S. ARMY CORPS OF ENGINEERS
CORNELL–DUBILIER ELECTRONICS SUPERFUND SITE
SOUTH PLAINFIELD, NEW JERSEY
CONTRACT: DACW41–02–D–0003, TO 0034

SITE PLAN

SCALE AS NOTED

MALCOLM PIRNIE, INC.
SEPTEMBER 2005
FIGURE 3

TABLES

TABLE 1. REPORTING LIMITS AND REGULATORY LIMITS FOR PCBs

PCB (Aroclors)	Reporting Limit for Solid Samples dry weight (µg/kg)[a,b,e]	Regulatory Limit (µg/kg)[c,d, e]
Aroclor 1016	33	50,000
Aroclor 1221	33	
Aroclor 1232	33	
Aroclor 1242	33	
Aroclor 1248	33	
Aroclor 1254	33	
Aroclor 1260	33	
Aroclor 1262	33	
Aroclor 1268	33	

Notes:

a. Lab will report dry weight results; dependent upon the sample moisture content and matrix effects the RLs achieved may in some cases be higher.

b. The RLs are Contract Required Quantitation Limits for soil from USEPA Contract Laboratory Program Statement of Work SOM01.1. (Aroclor 1262 and Aroclor 1268 were added by CLP for SOM01.01 and are not listed in USEPA SW-846 Method 8082.)

c. The limit of 50,000 ug/kg is for the sum of all Aroclors

d. The limit is based on TSCA

e. The lab RL for total PCBs in wipe samples must be sufficiently low to meet the regulatory limit of < 10 ug/100cm^2 at contaminated surfaces.

TABLE 2. REPORTING LIMIT AND REGULATORY LIMIT FOR ASBESTOS

Asbestos by PLM [a]	Reporting Limit (%)[b]	Regulatory Limit (%)[b,c]
Bulk Materials	1	1

Notes:

a. Polarized light microscopy as stated in USP EPA Method 600/R-93/116

b. This value is by weight.

c. The limit is based on NESHAP

TABLE 3. REPORTING LIMITS AND REGULATORY LIMITS FOR TCLP METALS

TCLP Metals	Reporting Limit (mg/L)[a]	Regulatory Limit (mg/L)[b]
Arsenic	0.5	5
Barium	10	100
Cadmium	0.1	1
Chromium	0.5	5
Lead	0.5	5
Mercury	0.02	0.2
Selenium	0.1	1
Silver	0.5	5

Notes:

a. The reporting limits given are one tenth of the regulatory limits. The actual reporting limit reported by the laboratory is to be established by the laboratory and shall not exceed the reporting limits given in this table.

b. The limit is based on RCRA

TABLE 4. REPORTING LIMITS FOR METALS

Metals	Reporting Limit dry weight (mg/kg)[a,b]
Aluminum	20
Antimony	6
Arsenic	1
Barium	20
Beryllium	0.5
Cadmium	0.5
Calcium	500
Chromium (total)	1
Cobalt	5
Copper	2.5
Iron	10
Lead	1
Magnesium	500
Manganese	1.5
Mercury (total)	0.1
Nickel	4
Potassium	500
Selenium	3.5
Silver	1
Sodium	500
Thallium	2.5
Vanadium	5
Zinc	6

Notes:

a. Lab will report dry weight results; dependent upon the sample moisture content and matrix effects the RLs achieved may in some cases be higher.

b. The RLs are Contract Required Quantitation Limits for ICP-AES for soil from USEPA Contract Laboratory Program Statement of Work ILM05.3.

TABLE 5. SAMPLE CONTAINER VOLUME, PRESERVATION AND HOLDING TIMES FOR SOLIDS

Parameter Analyzed	Approximate Sample Size	Container Material*	Preservation	Holding Time
Metals	16 oz.	G, P	4°C	180 Days
Mercury				28 days
TCLP Metals	16 oz.	G, P	4°C	180 Days TCLP Prep/ 180 Days
TCLP Mercury				28 days TCLP Prep / 28 days
Asbestos	1 oz	G, P	None	180 Days
PCB Aroclors	4 oz	G, Amber	4°C	14 days from collection to extraction, 40 days until analysis or the applicable CLP requirements

G = Glass
P = Plastic

* Core samples will be placed, whole, in plastic bags. Asbestos and paint chip samples will be placed in jars.

TABLE 6. ANALYTICAL METHODS

Parameter	Technique	Solids
Metals (TAL and TCLP)	ICP-AES	EPA-CLP (ILM05.3) or SW-846 Method 6010B[a,c b] TCLP metals prepared by SW-846 Method 1311[a,c]
Mercury	CVAA	EPA-CLP (ILM05.3) or SW-846 7470A/7471A
Asbestos	PLM	40 CFR 763, Subpart E EPA Method 600/R-93/116
PCB Aroclors	GC-ECD	EPA-CLP (SOM1.1/OLM04.3) or SW-846 Method 8082[a,c]

a. USEPA SW-846 "Test Methods for Evaluating Solid Waste," Third Edition, December 1996 including promulgated final update III.

b. Paint chip samples for lead only can alternately be analyzed by certified lab using method SW-846-7420.

c. Equivalent EPA DESA Lab methods will also be permitted.

ATTACHMENTS

ATTACHMENT 1

ATTACHMENT 1. DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are used to help decision-makers collect data of the right type, quality, and quantity to support decisions. The approach to developing DQOs is an iterative one, designed to take decision makers through a strategic planning process from broad project goals through a number of refining steps toward generating environmental data that will be appropriate to making the decisions needed to reach the goals.

This document begins with a "project-level" statement of the DQOs that sets the framework for addressing the environmental problems of the study area. The project-level DQOs focus on the information that the decision-making team needs to carry out an integrated assessment that will produce a comprehensive plan for the Pre-Design Investigation for the demolition of the Cornell Dubilier facility buildings.

1.0 State the Problem

The Cornell Dubilier Electronics Superfund Site, OU-2, facility buildings may contain building materials, which may be regulated when disposed of. They are known to contain asbestos, PCBs, and heavy metals. The objectives of the study for the facility buildings are the following:

- To characterize the nature and extent of hazardous constituents in the facility building materials in support of building demolition activities.
- To determine which and what building materials can be disposed of as hazardous wastes and as regulated non-hazardous waste.

2.0 Identify the Decision

To meet the objectives, the following fundamental questions will need to be answered during the investigation:

Fundamental Questions	Alternative Actions
If we do not sample any building materials, will there be a significant risk in assuming that the building materials are hazardous and/or non-hazardous for disposal?	– Assume that building materials are hazardous and dispose of them accordingly reducing the need for further sampling and analyses. – Determine if a building material is non-hazardous or hazardous by further sampling and analyses and dispose of accordingly based upon the data.
Are there sufficient data from previous investigations to make informed decisions	– If data is sufficient dispose of the building material without further sampling and

for disposal?	analyses – If insufficient collect additional sample for analyses as required to supplement and confirm existing data.
Are there building materials that need to be removed prior to demolition of the building(s)?	– Leave non-hazardous materials in the buildings during demolition. – Remove hazardous materials which would cause the waste to be hazardous.
What building materials may pose a health risk during building demolition activities?	- Examine Historical data - Collect and analyze more samples. - Compare data to action levels to determine which pose a health hazard - Use this data to properly dispose of the materials during demolition.

The following are the decisions need to be made:

Determine whether or not there is any risk by assuming materials are either hazardous of non-hazardous for disposal.

Determine if the existing data in the RI is sufficient and determine what additional analytical test data is require to properly dispose of the building materials during demolition.

Determine which building material(s) if any should be removed from the building(s) prior to demolition to reduce the hazards during demolition.

Identify which building materials pose a hazard compared to action levels by examination of the exiting and new data for the chemical of concern including as PCB Aroclors, metals, and asbestos against regulatory requirements.

3.0 Identify the Inputs to the Decision

The following inputs are required to answer the fundamental questions identified in Step 2:

- Review the existing environmental data for building materials in each building

- Gather information from field visit observations, photographs, common construction practice, building construction dates, physical setting, and contamination sources and process history
- Collect any additional building material samples needed to identify or confirm constituents of potential concern and to evaluate extent and nature of contamination
- Determine what analytical methods, and if field or laboratory analyses, will be appropriate
- Determine what the screening criteria will be based upon applicable regulations (local, state, federal) and action limits (risk based for human health) for demolition and continued occupancy, respectively

4.0 Define the Boundaries of the Study

The physical boundaries of the investigation are the perimeters of each of the facility buildings and any associated structures. All facility buildings are located within the site. Also included are the storage tanks and the water tower within the site. The temporal boundary of the study is defined by the activities associated with the building demolition of some or all the buildings. These activities are currently planned to commence in October, 2006. There may be practical constraints and obstacles which could interfere with the data collection. For example the buildings are not be entirely empty and may contain equipment and materials, which could interfere with the sampling efforts and making collection of the intended samples difficult.

5.0 Develop a Decision Rule

The purpose of this step is to integrate the outputs from the previous steps into a statement that defines the conditions that would cause the decision-maker to choose among alternative actions. The following primary decision rules will be used to answer the fundamental questions:

- For building demolition, if the maximum concentration for each sample at each homogeneous location for each parameter tested is below the screening criteria (regulatory or risk based), then disposal of that homogeneous building material, with respect to that parameter tested, would not be a concern.

6.0 Specify Limits on Decision Errors

This step is to specify the decision-maker's acceptable limits on decision errors, which are used to establish appropriate performance goals for limiting uncertainty in environmental data. These acceptable limits on decision errors allow decision-makers to generate resource-effective sampling designs while limiting uncertainties in the collected data.

There are two types of decision errors applicable to estimating the true value of a population: 1) sampling design error, which occurs when the sampling design is unable to

capture the complete state of natural variability over space and time; and 2) measurement error, which refers to a combination of random and systematic errors, known as the total error, can be controlled by hypothesis testing; that is, selecting the null hypothesis (H_o) and the alternative hypothesis (H_a) and testing to reject or accept H_o. The null hypothesis is the baseline condition that is presumed to be true in the absence of strong evidence to the contrary.

The null hypothesis and alternative hypothesis are as follows:

H_o: Building materials of the facility building(s) do not contain constituents, which are regulated when disposed of when the building(s) are demolished, nor pose risk if the building(s) are not to be demolished and will be occupied.

H_a: Building materials of the facility building(s) do contain constituents, which are regulated when disposed of when the building(s) are demolished, or pose risk if the building(s) are not to be demolished and will be occupied.

There are two types of decision errors: 1) the false rejection decision error (false positive), or Type I error, which occurs when the null hypothesis is rejected when it is true; and 2) the false acceptance decision error (false negative), or Type II error, which occurs when the null hypothesis is not rejected when it is false. In this case, the false rejection error is concluding that the building materials do contain constituents, which are regulated when disposed of or they pose risk if the buildings are not demolished and will be occupied, when the buildings actually do not contain such constituents. And the false acceptance error is concluding that the building materials do not contain constituents, which are regulated when disposed of nor do they pose risk if the buildings are not demolished and will be occupied, when the buildings actually do contain such constituents.

The consequence of the false rejection decision error will be unnecessary expenditure of resources such as funding, personnel, and time. The consequence of the false acceptance decision error is that the constituents in the building materials pose risk to the environment or human health. Because of the possible severity of the false acceptance decision error consequence, the false rejection error is more tolerable than the false acceptance decision error. The former will occur when the analytical results are biased high, and the latter will occur when the analytical results are biased low.

7.0 Optimize the Design for Obtaining Data

This step involves identifying the most resource-effective sampling and analysis design for generating data that are expected to satisfy project DQOs.

The consequence of the decision error will need to be balanced against the cost of limiting the possibility of these errors. These errors will be managed by the use of precise and accurate analytical methods and a relatively large number of samples along with duplicate samples. The large number of samples will need to be collected to minimize a false acceptance decision, and to minimize risk. The approach to overcome

the large number of samples is to limit the number of samples for homogeneous materials and of materials that are known (or highly likely) to contain constituents of concern. The approach to overcome the risk is to systematically perform sampling, even in areas where the constituents of concern are not expected to be present.

The sampling design will consist of a nonprobabilistic sampling (judgmental sampling) methodology backed up with a probabilistic sampling (simple random sampling) methodology. In the judgmental sampling methodology, the sampling locations are based on the investigator's experience and expert knowledge of the buildings and the site. Typically, this is useful to confirm the existence of contamination at specific locations, based on visual and historical information. Judgmental samples can be used subjectively to provide information about specific areas on the buildings. However, to confirm areas that are not suspected of containing constituents of concern, a simple random sampling methodology will be performed on those areas. With simple random sampling, all areas that are not suspected of containing constituents of concern have an equal probably of being selected, and each sampling point is selected independently from all other sample points. Sub-locations may also be sampled at equally spaced points depending on the size and homogeneity of the area.

Both laboratory analyses and field analysis will be conducted. Laboratory analysis will be conducted for parameters such as polychlorinated biphenyls, total metals, toxicity characteristic leaching procedure (TCLP) constituents, lead in paint chips, and asbestos. We anticipate that field analysis will be performed for lead in surfaces with a portable X-Ray Fluorescence (XRF) analyzer.

ATTACHMENT 2

ATTACHMENT 2. QUALITY ASSURANCE TABLE FOR NON-CLP ANALYSES

PCBs as Aroclors			
USEPA Method 8082 Polychlorinated Biphenyls by Gas Chromatography			
Audits Required	**Frequency of Audits**	**Limits**	**Action**
Initial Calibration	Prior to analyzing samples	Calibration must follow the requirements given in 8082, Section 7.4.	The calibration requirements must be met before samples are analyzed. The field samples cannot be analyzed until an acceptable calibration is achieved for the instrument
Continuing Calibration Verification for Aroclor 1016 and Aroclor 1260	At the beginning of each 12-hour shift, at a minimum of once every 20 samples, and at the end of the analysis sequence	≤ ± 15%	If the control limits are still not met, the analysis must be stopped, the problem corrected, and a new initial calibration check run. Sample analysis cannot continue until the control limits are met. Reanalyze all samples not bracketed by acceptable calibrations.
Method Blanks	One per analytical batch of 20 or fewer samples	< RL	The method blanks are reagent blanks prepared and analyzed exactly as if they were samples. At least one method blanks should accompany each analytical batch. If above the limits, the lab should investigate the source of contamination. If the method blank exceeds the control limits, corrective actions must be taken, the sample batch must be re-prepared and analyzed.
Rinsate/Field Blank	Before sampling using sampler. Not to exceed one Rinsate per day of sampling	< RL	Any problems with the Rinsate blanks will be addressed by the data validator, not the laboratory.
Laboratory Control Standard (LCS)	Once per sample batch	≤ ± 30%	The LCS should be prepared from an independent source than used for standards. If the LCS exceeds the limits, investigate and correct the problem.
Matrix Spike (MS)	5% of field samples or once per analytical batch	%R 70-130%	If a MS exceed the recovery limits of 75-125%, verify satisfactory instrument performance. If the RPD exceeds 25%, verify that no error was made preparing the spikes, review the analytical procedure with the performing laboratory personnel and note the findings and correction actions in the case narrative.
Matrix Spike Duplicate (MSD)	5% of field samples or once per analytical batch	%R 70-130%	
		RPD ≤ 30%	
Field Duplicate	5% of field samples	RPD ≤ 30%; for analytes > 5 times the RL.	The laboratory will not know which sample is the field duplicate; if the limits are exceeded, this will be addressed by the data validator.

ATTACHMENT 2. QUALITY ASSURANCE TABLE FOR NON-CLP ANALYSES

Metals including Mercury

USEPA SW-846 Method 6010B and 7470A/7471A. Method 6010B = Inductively Coupled Plasma - Atomic Emission Spectrometry. Methods 7470A/7471A = Mercury -Cold Vapor Technique.

Audits Required	Frequency of Audits	Limits	Action
Calibration Blank	Immediately following daily calibration, after every tenth sample, and at the end of the sample run	< RL	Reanalyze previous ten samples or will be addressed by the data validator
Continuing Calibration Verification	Immediately following daily calibration, after every tenth sample, and at the end of the sample run	≤ ± 10%	Correct problem or recalibrate instrument; reanalyze previous ten samples.
Method Blanks	One per analytical batch of 20 or fewer samples	< RL	The method blanks are reagent blanks prepared and analyzed exactly as if they were samples. At least one method blanks should accompany each analytical batch. If above the limits, the lab should investigate the source of contamination. If the method blank exceeds the control limits, corrective actions must be taken, the sample batch must be re-prepared and analyzed.
Rinsate/Field Blank	Before sampling using sampler. Not to exceed one Rinsate per day of sampling	< RL	Any problems with the Rinsate blanks will be addressed by the data validator, not the laboratory.
Laboratory Control Standard (LCS)	Once per sample batch	≤ ± 10%	The LCS should be prepared from an independent source than used for standards. If the LCS exceeds the limits, investigate and correct the problem.
Matrix Spike (MS)	5% of field samples or once per analytical batch	%R 75-125%	If a MS exceed the recovery limits of 75-125%, verify satisfactory instrument performance. If the RPD exceeds 25%, verify that no error was made preparing the spikes, review the analytical procedure with the performing laboratory personnel and note the findings and correction actions in the case narrative.
Matrix Spike Duplicate (MSD)	5% of field samples or once per analytical batch	%R 75-125% RPD ≤ 20%	
Field Duplicate	5% of field samples	RPD ≤ 30%; evaluated for analytes > 5 times the RL.	The laboratory will not know which sample is the field duplicate; if the limits are exceeded, this will be addressed by the data validator.

Asbestos

EPA Method 600/R-93/116 Method for the Determination of Bulk Building Materials by Polarized Light Microscopy (PLM)

Audits Required	Frequency of Audits	Limits	Action
Field Duplicate	5% of field samples	RPD ≤ 30% or Diff ≤ RL	The laboratory will not know which sample is the field duplicate; if the limits are exceeded, this will be addressed by the data validator.

ATTACHMENT 3

Procedure to Conduct Sample Management for CLP and non-CLP Samples

I. Introduction

This guideline is to provide reference information on sample management procedures.

II. Definitions

Contract Laboratory Program (CLP). The U.S. Environmental Protection Agency (USEPA) CLP was developed to retain laboratory services that will ensure that all environmental samples collected under the Superfund Program will be analyzed in accordance with recognized EPA laboratory methods and quality assurance/quality control (QA/QC) procedures.

Target Compound List (TCL). This is a list of organic compounds typically analyzed for by the CLP. The list is broken into three subdivisions; volatiles, semi-volatiles, and pesticide/PCBs.

Target Analyte List (TAL). This is a list of inorganic parameters typically analyzed for by the CLP. Parameters on this list include heavy metals and cyanide.

Routine Analytical Services (RAS). Laboratory analysis for substances or parameters shown on the TCL and TAL in solid and aqueous samples.

Non-RAS. Laboratory analysis for substances or parameters not shown on the TCL and TAL. Analysis of non-soil/sediment, nonaqueous matrices, and analysis of RAS compounds using non-RAS protocols.

Trip Blanks. Trip blanks are used to check for sample contamination originating from sample transport and shipping, as well as from site conditions. Trip blanks are necessary when aqueous environmental samples are collected for volatile organic analysis samples are collected.

Rinsate Blanks. Rinsate blanks, also known as field blanks, are used to check the efficacy of sampling equipment decontamination procedures. Rinsates are collected for each type of non-dedicated sampling equipment used onsite. Demonstrated analyte-free water is poured over the equipment and collected into containers and analyzed for the analytes of concern.

Field Duplicate. These are two separate samples collected at the same sampling point. Field duplicates are used to determine field sampling precision and are collected at a set frequency for each analyte group. For VOC samples, duplicate samples are collocated samples. For all other parameters, a sample aliquot is homogenized and split into two sampling containers.

Matrix Spike/Matrix Spike Duplicates (MS/MSD). This is the process by which standard mixes of various organic TCL compounds are added to field samples prior to extraction. The sample is split into duplicates and analyzed. The analysis is used to evaluate the matrix effect of the sample upon the analytical methodology. Triple volume of aqueous samples for MS/MSD analysis is collected in the field, at a frequency of at least 5 percent per matrix/concentration. No extra volume is required for the soil samples.

Matrix Spike/Matrix Duplicates (MS/MD). The spike analysis is the process by which standard mixes of various inorganic TAL parameters are added to environmental samples prior to digestion. The analysis is used to evaluate the matrix effect of the sample upon the analytical methodology. The duplicate analysis is the process by which the assigned sample is split in two and analyzed at the laboratory. The analysis is an indicator of analytical precision based on each sample matrix. Triple volume of aqueous samples for MS/MD analysis is collected in the field, at a frequency of at least 5 percent per matrix/concentration. No extra volume is required for soil samples.

Low-Concentration Sample. Samples in which a compound may be present at concentration levels less than 10.0 ppm.

Medium-Concentration Sample. Samples in which a compound may be present at concentration levels equal to or greater than 10.0 ppm to as much as 15 percent (150,000 ppm) of the total sample.

High-Concentration Sample. Samples in which a compound may be present at concentration levels greater than 15 percent (150,000 ppm) of the total sample.

III. Guidelines

The purpose of sample management is to assure that all samples collected during this hazardous waste site investigation are accounted for when the project is completed. The sample management officer is also responsible for assuring that the proper quality assurance/quality control (QA/QC) samples are collected. These purposes are achieved by adhering to the following procedures:

1) Laboratory Coordination

a) CLP Samples

Prior to collecting any samples, a request must be made through RSCC for a laboratory per USEPA Region 2 SOP No. HW-32, Standard Operating Procedure For Implementing The National Strategy For Procuring Analytical Services for All OSWER Programs, Revision 5, March 17, 2005. At this time, any requested modifications to the CLP SOWs must also be described (*e.g.*, lower detection limits,

adding a parameter, such as titanium, to the TAL, requesting a quicker turnaround time (TAT)). A description of how to request CLP services is including in Section 2.4 of USEPA's CLP Guidance for Field Samplers, OSWER 9240.0-35, and August 2004. A request for CLP services includes the following:

i) Contact RSCC to discuss the split sampling and CLP sample submission requirements. For CLP samples Forms II Lite software will be used to record the samples information and create CLP sample numbers and the required COC forms. For assistance with Forms II Lite call the help desk at 703-818-4200 or check the Forms II Lite Web Site at http://dyncsdao1.fedcsc.com/itg/forms2lite/.
ii) Fill out an RSCC request form. This must be sent to RSCC by 12:00 pm (noon) on the Tuesday prior to week of the sampling event.
iii) RSCC will contact the originator of the request by Friday with the Case Number and assigned laboratories. At times, the USEPA-DESA Laboratory will choose to perform all or part of the analysis requested.
iv) For long-term project, weekly contact will be maintained with RSCC.

b) Non-CLP Samples

Subcontractor laboratory(ies) will be procured for the project to conduct analysis of non-CLP parameters. Weekly contact must be maintained with these laboratories to inform them of upcoming sampling.

2) Preparing the Sample Containers

a) Malcolm Pirnie (for CLP) or the laboratory (for non-CLP) will purchase certified clean sample containers from an approved supplier. Copies of these certifications will be brought to the site while sampling and then kept in site files for future reference.

b) Each bottle used to collect a sample must be identified by a supplier and lot number to ensure that it is permanently associated with the sample collected in that particular container. This procedure also applies to containers used to carry demonstrated analyte-free water to be used for blank preparation. This is to ensure that for all samples collected, the specific sample bottles used can be traced to the sample container contractor, QC certification paperwork and custody records applicable to their identifying lot numbers.

3) QA/QC Samples

a) VOC Trip Blanks
i) One trip blank is required for each day that aqueous environmental samples are collected for volatile analysis.

ii) Trip blanks consist of two 40 mL septum vials into which 4-5 drops of 1:1 hydrochloric acid (HCl) is introduced prior to filling them with demonstrated analyte-free water.
iii) Trip blanks are prepared by the laboratory or in the field in a clean zone. They then remain with the field personnel throughout the sampling event and are shipped with the volatile samples in the same cooler.
iv) The trip blank must be stored away from solvents and must be preserved, packaged, cooled to 2-6°C and shipped to the laboratory with the other volatile samples.

b) Rinsate Blanks

i) Rinsate blanks are collected for each type of equipment used to collect samples. The rinsates will be collected at a timed frequency depending on the sample capacity. At a minimum, rinsates have to be collected at one per week. At a maximum, rinsates have to be collected at one per location per day. Rinsates will likely be collected at a frequency of one per 10 decontamination events. Decontaminated equipment must be properly stored in an area and in a manner that will prevent cross contamination.
ii) Where possible, composite rinsates will be collected from all equipment associated to a particular matrix for analysis of non-volatile parameters. A separate rinsate will be collected for each type of equipment associated to a particular sample matrix which will be analyzed for volatile organics.
iii) Rinsate blanks consist of pouring demonstrated analyte-free water over clean equipment and collecting it into sample containers to be analyzed for the analytes of concern.
iv) Rinsate blanks are preserved, packaged, and shipped in the same manner as low concentration aqueous environmental samples.

c) Field Duplicates

i) Samples for duplicate analysis are collected in the field, for each matrix sampled at a frequency as described in QAPP.
ii) Sufficient quantity of matrix must be collected from the same sample location to fill a duplicate set of sample containers. The duplicate volume is shipped to the laboratory under a separate sample ID (or CLP sample number).
iii) For soil/sediment samples the volatile organic fraction is collected as collocated grab samples while the non-volatile fraction is homogenized prior to collection.

d) Matrix Spike/Matrix Spike Duplicate (MS/MSD) & Matrix Spike/Matrix Duplicate (MS/MD)

i) The designation of a sample for MS/MSD analysis for organics and MS/MD analysis for inorganics is required for 1 in 20 environmental samples per concentration/matrix.
ii) Three times the total volume is necessary for collection of aqueous MS/MSD samples. No extra volume is required for the soil samples.
iii) MS/MSD and MS/MD samples are noted as such on the chain of custody (COC).

4) Sample Documentation, Packaging, and Shipping Procedures

One or more of the field personnel will be designated as the sample management officer(s). The sample management officer will bear the ultimate responsibility for the documentation, packaging, and shipping of the samples. These procedures are outlined below.

a) Documentation/Chain of Custody

For documentation purposes, the field team will enter information about each sample into the field logbook as they collect the sample. As this information is entered into the logbook, it is also transmitted to the sample bottle label(s). The minimum information recorded includes the following:

- Sample number (sample ID)
- Sample date and time of collection
- Preservative(s) used
- Analyses required

i) Once all of the samples are grouped in association for shipment to a specific laboratory, the COC can be filled out (for CLP, COC and sample labels will be printed from FORMS II Lite). The sample labels are then covered with clear tape, if necessary. In addition, for CLP samples, a sample label is placed on the sample tag. The sample labels will contain the following information:

- MALCOLM PIRNIE-designated sample number
- For CLP samples only, the assigned CLP Number
- The month, day, and year the sample was collected
- The type of analysis requested
- The type of preservation performed in the field.

b) Packaging and Shipping Samples

i) Make sure the caps on the sample bottles are tightly sealed. Wipe down the outside of all of the sample bottles.

ii) Preserve the samples according to requirements in the QAPP.

iii) For CLP, apply one custody seal around the circumference of the container or over the cap and onto the sides of the container. The custody seal must applied to sample containers in such a manner as to reveal if the container was opened during transit. Note: Septum vials should not be covered over the top.

iv) Place containers in its individual zip-lock bag. VOA vials for the same sample may be placed in one bag. Eliminate extra air space from the bag before sealing. EnCore® device comes in its own ziplock bag and this bag will be used.

v) For CLP samples, place the associated sample tag into the zip-lock bag with the sample.

vi) Prepare the shipping container (usually a cooler). The cooler will be prepared so that no leakage can occur during shipping. All valves on the cooler will be securely duct taped, both inside and outside the cooler, and the cooler will be lined with either plastic or a large garbage bag. Only coolers that conform to the general design requirements in 49 CFR 173.410 will be used for shipment.

vii) The VOC samples should be packed together with the trip blank.

viii) Put 1-2 inches of packing material in the bottom of the coolers, then place the samples into the garbage bag in the cooler.

ix) Surround the sample bottles with bags of ice (only the samples that need to be cooled – refer to the QAPP requirements for sample preservation. The ice will not be kept in its original bag, but will be repacked into ziplock bags. Use enough ice to ensure that the proper temperature (2-6°C) is maintained during transport. Place a temperature blank (40-mL vial filled with DI water and labeled as "temperature blank") into the cooler.

x) Place packing material over and around the sample bottles. Sufficient packing material must be used so the bottles will not move or break during transport.

xi) Once the samples are packed, the plastic or garbage bag will be closed and securely tied/taped.

xii) Prior to shipment, the relinquished by and received by sections of the COC form will be filled in. Generally, the shipper (courier) will not sign the COC. Therefore, the courier's name is filled in by the sample management officer. The original COC form will then be placed in a ziplock bag and taped to the inside of one of the lead cooler; one copy of the COC form(s) will be placed in a ziplock bag(s) and placed in the other cooler(s).

xiii) For CLP samples, one copy of the COC form will be retained by the sample management officer and one copy will be sent to RSCC. For non-CLP samples, one copy of the COC form will be retained by the sample management officer.

xiv) Close the cooler and seal with strapping tape. If visibly dirty, the outside of the cooler will be wiped down. Apply signed and dated custody seals to the cooler. Place two custody seals diagonally across from each other where the cooler lid meets the cooler. The custody seals will be applied in such a manner as to reveal if the cooler was opened during transit.

xv) An address label will be placed on the outside of each cooler. The label will be covered with clear tape. If more than one cooler is being sent to one destination, each cooler will be appropriately labeled as 1 of X, 2 of X, *etc.* The airbill will be attached to one of the coolers. Usually, the samples will be sent via overnight carrier for next day delivery. This should be confirmed with the Field Team Leader.

xvi) The laboratory will be notified of the shipment before 9 a.m. ET on the day after shipping. For CLP samples, fill out the Sample Shipping Call-In Form. Call or fax the shipping information to RSCC by 9:00 am the following morning. For non-CLP samples, the notification system agreed to in the subcontract will be followed.

Note: Some samples have very short holding times. In some limited instances, the samples may be either hand delivered to a laboratory or picked up by the laboratory's courier service.

ATTACHMENT 4

Procedure to Conduct Sample Preservation

I. Introduction

This guideline is to provide reference information on the accepted methods of sample preservation. Not all portions of this guideline may be applicable to the current sampling activities of this project.

II. Materials

Preservatives:

a. 1:1 HCl - (Hydrochloric Acid/Deionized Water)
b. HNO_3 - full strength (Nitric Acid)
c. NaOH - 10 N (Sodium Hydroxide)
d. H_2SO_4 - full strength (Sulfuric Acid)
f. Ice

Additional Materials:

a. Disposable Pasteur pipettes
b. Pipette pumps - 10 mL or 2 mL
c. Latex pipette bulbs
d. Squeeze bottle with deionized water
e. Clear wide mouth glass jar for water pipette
f. Paper towels
g. Lead acetate paper
h. Cadmium nitrate or cadmium carbonate (if using lead acetate paper)
i. Potassium iodide - starch test paper (KI-starch paper)
j. Ascorbic Acid (if using KI starch paper)
k. Filter paper
l. Filter funnels (disposable or decontaminated)
m. Filter vessel with hand pump
n. pH paper
o. Scale
p. Cooler(s)

Safety Materials:

a. safety glasses
b. nitrile or latex gloves
c. labcoats or aprons
d. MSDS sheets
e. Eyewash

III. Discussion

Complete and unequivocal preservation of samples is a practical impossibility. At best, preservation techniques slow down the chemical and biological changes that inevitably continue after the sample is removed from the parent source. The changes that take place in a sample are either chemical or biological. In the former case, certain changes occur in the chemical structure of the constituents that are a function of physical conditions. Metal cations may precipitate as hydroxides or form complexes with other constituents; cations or anions may change valence states under certain reducing or oxidizing conditions; other constituents may dissolve or volatilize with the passage of time; and metal cations may also adsorb onto surfaces (glass, plastic, quartz, *etc.*). Biological changes taking place in a sample may change the valence of an element or a radical to a different valence. Soluble constituents may be converted to organically bound materials in cell structures, or cell lysis may result in release of cellular material into solution. The well known nitrogen and phosphorus cycles are examples of biological influence on sample composition. Therefore, as a general rule, it is best to analyze the samples as soon as possible after collection. This is especially true when the analyte concentration is expected to be in the low ug/L range.

Methods of preservation are relatively limited and are intended generally to (1) retard biological action, (2) retard hydrolysis of chemical compounds and complexes, (3) reduce volatility of constituents, and (4) reduce absorption effects. Preservation methods not outlined below are generally limited to pH control, chemical addition, refrigeration, and freezing.

IV. Guidelines

All Samples

With few exceptions, most samples need to be cooled to between 2-6 °C immediately after sample collection.

Preserving non-Soil/Sediment Solid Matrix Samples

Equipment

This procedure should be used when preserving concrete core samples. No preservation requirements are indicated for asbestos, paint chip, or window caulking samples until arrival at the laboratory. No chemical preservation is required for solid matrix samples. Field personnel should have the following materials on hand for sample preservation:

1. Ice
2. Coolers

Preservation Procedure

1. Each cement core and associated chips/debris should be stored double-bagged in re-sealable plastic bags marked with the required sample information.
2. Place each sample in a cooler with enough ice to maintain the sample temperature between 2 and 6 °C prior to shipment to the analytical laboratory.

3. The samples should be stored between 2 and 6 °C until the time of analysis.

Preserving Aqueous Volatile Organic Compound (VOC) Samples

Equipment

Field personnel should take the following materials for VOC sample preservation to the sampling locations:

1. One 40-mL VOA vial containing 1:1 HCl.

   The 1:1 HCl should be transferred on site from a 1-liter plastic-coated glass bottle to one properly labeled 40-mL glass vial by using a glass funnel. Hand and eye protection must be worn during the transfer and handling of hydrochloric acid. Field personnel must attempt to keep the 40 mL vial in an upright position during field sampling. The 40-mL vial must be kept in a plastic ziplock bag.

2. Plastic ziplock bag containing pH indicator strips for each sampling location.
3. Nitrile or latex gloves
4. Eye protection
5. Plastic ziplock bag for disposal of used pH indicator strips and latex gloves.

Preservation Procedures

1. For each different type of aqueous sample to be collected, a test sample must be preserved to determine if the preservation procedure will cause an adverse reaction. Note that a test vial must also be collected when the temperature changes (*e.g.*, each season) and whenever a sample is significantly different in appearance than the test sample. First, fill a test vial one-half full with the sample matrix to be collected. Note the color and clarity of the sample.
2. Test the pH by inserting one pH paper strip into the test vial. If the pH is less than 2.0, as indicated by a blue color on the strip, collect the samples without acidifying. Document this in the field application. The field sample management officer must document the sample as not preserved on the COC. If the pH is greater than 2.0, continue to Step 3. The pH indicator paper strip should be put into a plastic bag for later disposal.
3. Dispense 10 drops of 1:1 HCl from the pipet. Tap the vial gently to mix. If color develops, precipitates form, effervescing occurs, or an exothermic reaction (heat generation determined by holding the vial firmly) occurs, do not acidify the samples and document the reason for not acidifying in the field application. This information should also be included on the COC. If no adverse reactions occur when acid is added to the sample, proceed to Step 4.
4. Test the pH of the sample. If the pH is less than 2.0, proceed to Step 5. If the pH is greater than 2.0, add 1:1 HCl a few drops at a time (keeping count) until the pH is less than 2.0; then proceed to Step 5.
5. Fill the test vial with sample until the vial is nearly full to the top. Gently tap the side of the vial to mix, and test the pH of the sample. If the pH is less than 2.0 proceed to the next step.
6. If the pH is greater than 2.0, again add 1:1 HCl a few drops at a time (keeping count) until the pH falls below 2.0. Proceed to the next step.

7. Note the amount of 1:1 HCl added to the test vial. Add this amount of 1:1 HCl to all of the 40 mL vials, using the same glass pipet, before collecting the samples. These samples are then packaged and cooled to between 2-6 °C prior to shipping to the CLP laboratory.
8. Store the samples between 2-6 °C until the time of analysis.
9. Properly dispose of the test vials and all used sample preservation equipment.

Preserving Aqueous Inorganic Samples with Acid

1. Add the acid to the sample using a pipette. Typically, depending on the size of the pipette and the original pH of the sample, approximately ½ a pipette of acid is required per liter of sample. Recap the sample bottle and turn it gently upside down to mix the contents.
2. Check the pH by pouring a few drops of the sample over the pH paper; do no dip the pH paper directly into the sample. The pH of the sample should be < 2.
3. If the sample contains a significant particulate fraction, acidification without filtration could result in deceptively high values for the aqueous sample. Varying amounts of particulate matter can also give large differences in metal values for duplicate acidified aqueous samples. Observation, therefore, should be made and recorded in the field application and also noted on the COC. If an obvious change is observed during sample preservation, which may bias the results, the Site Quality Control Officer (SQO) should be consulted.
4. If the pH is still > 2, repeat steps 1 and 2 until the pH is < 2.
5. Store the samples at 2-6 °C until the time of analysis.

Preserving Aqueous Cyanide Samples

1. Test a drop of sample with potassium iodide-starch test paper (KI-starch paper). A resulting blue color indicates the presence of oxidizing agents and the need for treatment. Add ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add an additional 0.6 g of ascorbic acid for each liter of sample volume.
2. Add NaOH to the sample using a pipette. Typically, depending on the original pH of the sample, approximately 2 mL of NaOH per liter of sample is required. Recap the sample bottle and turn it gently upside down to mix the contents.
3. Check the pH by pouring an aliquot of the sample over the pH paper; do not dip the pH paper directly into the sample. The pH of the sample should be > 12.
4. If the pH is still < 12, repeat steps 2 and 3 until the pH is > 12.
5. Store the samples at 2-6 °C until the time of analysis.

Refer to the sample preservation table in the QAPP for specific sample preservation requirements.

ATTACHMENT 5

ATTACHMENT 5. Example CLP Chain of Custody Form

USEPA Contract Laboratory Program
Organic Traffic Report and Chain of Custody Record

Case No: _____
DAS No: _____
SDG No: _____

	Chain of Custody Record		For Lab Use Only
Date Shipped:		Sampler Signature:	
Carrier Name:	Relinquished by: (Date/Time)	Reveived by: (Date/Time)	
Airbill:	1.	1.	Lab Contract No:
Shipped to:	2.	2.	Unit Price:
	3.	3.	Transfer to:
	4.	4.	

CHAIN OF CUSTODY

Organic Sample No.	Matrix	Sampler	Conc/Type	Preservative	Location	Collection Date/Time	PCB Aroclors (SW-846-8082)	TAL Metals (SW-846 Method 6010B)	RCRA TCLP Metals (SW-846 Methods 6010B/7470A/7471A)	Asbestos (600/R-93/116)	Remarks	For Lab Use Only Sample Condition Upon Receipt
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												

Shipment for case complete (Y or N)?	Sample to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature upon receipt:	Chain of Custody Seal Number:
Concentration: L = low, M = low/medium, H = High		Type/Designate: C = Composite, G = Grab		Custody Seal Intact? / Shipment Iced?

ATTACHMENT 5. EXAMPLE OF NON-CLP CHAIN OF CUSTODY FORM

Chain of Custody Record	TAT: PCBs: _____ Lead only: _____ TAL Metals: _____ Asbestos: _____ TCLP Metals: _____ Other: _____	**Case No:** _____ DAS No: _____ SDG No: _____

Date Shipped: **Carrier Name:** **Airbill:** **Shipped to:**	**Chain of Custody Record** Relinquished by: (Date/Time) 1. 2. 3. 4.	Sampler Signature: Reveived by: (Date/Time) 1. 2. 3. 4.	**For Lab Use Only** Lab Contract No: _____ Unit Price: _____ Transfer to: _____

CHAIN OF CUSTODY

Field Sample ID	Matrix	Sampler	Conc/Type	Preservative	Location	Collection Date/Time	PCB Aroclors (SW-846-8082)	TAL Metals (SW-846 Method 6010B)	RCRA TCLP Metals (SW-846 Methods 6010B/7470A/7471A)	Asbestos (600/R-93/116)		Remarks	For Lab Use Only Sample Condition Upon Receipt
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													

Shipment for case complete (Y or N)?	Sample to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature upon receipt:	Chain of Custody Seal Number:	
Concentration: L = low, M = low/medium, H = High		Type/Designate: C = Composite, G = Grab		Custody Seal Intact?	Shipment Iced?

ATTACHMENT 6

ATTACHMENT 6. FIELD MODIFICATION FORM FOR CORNELL DUBILIER ELECTRONICS SUPERFUND SITE MALCOLM PIRNIE, INC.

Date:

Document:

Activity:

Requested Modification:

Rationale:

Attachments:

Malcolm Pirnie Project Manager: _____

Malcolm Pirnie Deputy Project Manager: _____

Malcolm Pirnie Site Quality Control Officer: _____